

Before you put in anti-freeze...



PAN OUT RUST

with

DU PONT

Cooling System

CLEANSER

A rust-clogged radiator overheats, wastes anti-freeze, causes trouble and expense

Don't put anti-freeze into a rust-clogged radiator. Clean out the rust, scale and scum now, before winter sets in. Just pour a can of DU PONT CLEANSER into your radiator, run the engine for 30 minutes or more, then drain. It's easy to do, cleans thoroughly, safely, without reverse flushing.



After cleaning, keep out rust with



DU PONT Acid and Rust INHIBITOR

You can keep your radiator free from rust all season, after cleaning, by pouring in a can of DU PONT ACTO and RUST INHIBITOR. Retards rust formation, keeps out seid.

Prevent leaks and loss of anti-freeze with



DU PONT Cooling System SEALER

You can stop leaks quickly and securely—and help prevent leaks in the future—by pouring in ou pont cooking system sealer. It won't clog the radiator or harm home or metal parts.



BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY



HYGRADE: 37-IS NORTHERN BLVD., LONG ISLAND CITY I, NEW YORK

Copyrighted multiplay

VOLTA TORREY, EDITOR

Howard Allaway, MANAGING EDITOR Howard C. Jensen, ART EDITOR

Harry Walton, MECHANICS & SIANDICRAFT EDITOR

Hartley E. Howe, Frank Rowsonie, Jr., Assistant Managing editors

ASSOCIATE EDITORS: Alden P. Armagnuc, Devon Francis, Sheldon M. Gallager, Richard Giovine, Kendall W. Goodwyn, Robert Gorman, Herbert O. Johansen, Martin Mann, Denis Snelgr, Robert P. Stevenson.

ART DIRECTOR: Harry Samuels, ART ASSOCIATES: Herbert Anthony, Rolf O. Erickson, Eric Karminski, Jr., Richard, Meyer, Frances Cooper Daniels (Production). RITORIAL ABSISTANTS: Julia C. Bove, Carol Ennis, Rita K. Gilbert, Rosemary C. Knorr, Georgette Sparks, Harriet Trowbridge, Ruth Westphal.

BTAFF PHOTOGRAPHERS: W. W. Morris (Chief), Hubert Luckett, Orlando Guerra (Darkroom).

WESTERN EDITOR: Andrew R. Boone (Los Angeles).

This Month's Big Features:



Gerald Wendt, former dean of Pennsylvania State College's chemistry and physics school, describes the coming atomic airplanes on page 98. After serving as science director of the New York World's Fair, he became editorial director of Science Illustrated, and is now a noted lecturer on science.

Scientist Freviews First Atomic Flane	30
All About Russian Cars	.106
Steel Plant to Be World's Most Modern	.113
Wilbur Shaw Reports on GM's New Engine.	.125
He Turned a Hobby into a Big Business	.131
Model Railroad Runs on Real Steam	.140
These Cars Are Tailored to Order	146
How They Make Shotgun Shells	.170
Winterizing Your Home	.177
Underconting Your Own Car	193
Gus and the Missing Straddle Truck	.196
How to Judge Used Power Tools	.201
Experts Show You How to Move	.208
How to Photograph Your Boss	.214
Shovel Snow with a Lawn-Mower Engine	225
Heat That Travels Like Light	.230

(More features and departments are listed on page 4.)

Godfrey Hammond, FUBLISHER - Stephen P. Glennon, ADVERTISING DIRECTOR

EDITORIAL OFFICES: 353 Fourth Avenue, New York 10, N. Y.
ADVERTISING OFFICES: New YORK - 353 Fourth

Ave.; CHICAGO-360 North Michigan Ave.; DETROIT-820 Book Bldg.; SAN FRANCISCO-681 Market St.; CLEVELAND -328 Citizens Bldg.; LOS ANGELES-1052 West 6th St.

Copyrighted Hamile

Popular Science Monthly is published monthly at 355 Fourth Avenue, New York 10, N. Y., by Popular Science Publishing Co., Inc., Godfrey Hammond, President and Treasurer: B. C. Wilson, Stephen P. Giennon, Vice-Presidents: F. W. Briggs, Secretary, Entered as second-class matter Dec. 18, 1918, re-entered as second-class matter July 25, 1948, at the Post Office in New York, N. Y., inner the act of March 3, 1970; additional entry as second-class matter at Dayton, Ohio, Entered as second-class matter at the Post Office Department. Canada. Frinted in U.S.A. Copyright, 1951, by Popular Science Publishing Co., Inc., All rights reserved in the United States, Great Britain, and in all countries participating in the International Copyright Convention and Pan-American Copyright Convention, Tearly subscriptions to United States, its possessions and Canada. \$3.00 (2 years, \$3.50; 3 years, \$7.50); foreign countries \$1 per year extra. Subscribers must notify us of change of address four weeks before next publication. Be sure to give both old and new addresses, including sone numbers. Vol. 159. No. 4.

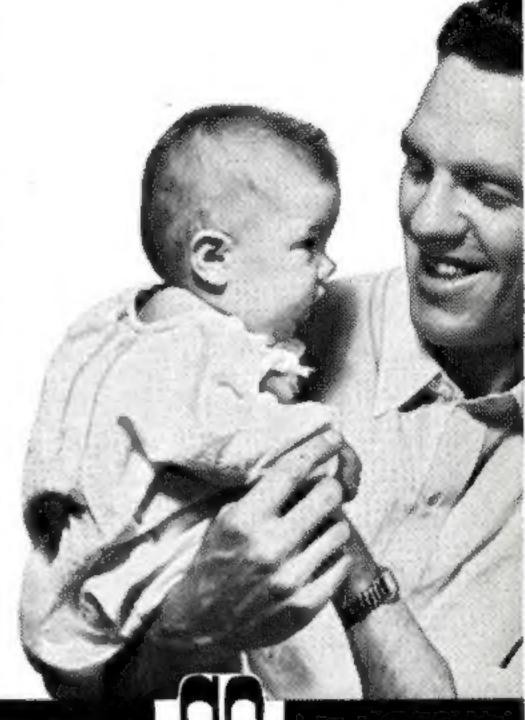
The world on your shoulders

What's ahead for that baby of yours? Happiness? Security? A good education? These, of course, and everything else you can provide. For, above all, you want to be a good father — and a good provider.

That's why you'll find so many young, married men enrolled with the International Correspondence Schools. The average I.C.S. student is 28, employed, married and a father. His biggest concern is security for himself and his family. So he works days and studies nights. And inside of six months, the average student reports a pay raise or a promotion or both. It's a record that we at I.C.S. are proud of—and a record you can duplicate.

You owe it to yourself—and your family—to find out more about the "security insurance" that training provides. Information is given free and without obligation. You need only mail the coupon.

Remember, the world is on your shoulders - all ten, precious pounds of it.

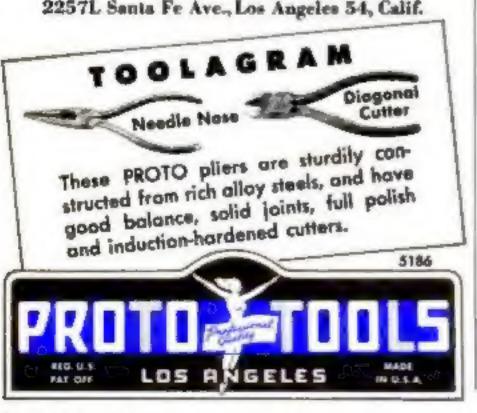


INTERNATIONAL CORRESPONDENCE SCHOOLS

BOX 7689-M, SCRANTON 9, PENNA. th Anniversary Without cost or obligation, please send me full particulars about the course BEFORE which I have marked X: Industrial Engineering
Installing thetrativementalism
Industrial Metallurgy
Machine Shop
Mechanical Drufting
Mechanical Engionaring
Moid-Loft Work
Patternmaking — Wood, Metal
Reading Shop Bleeprints
Shop-Metal Drufting
Shop-Metal Worker
Ship Drafting Dullding Estimating Air Conditioning and Plumbing Courses | Heating | Govil Engineering |
| Heating | Gontracting and Building afrigaration | Highway Engineering |
| Reading Structural Blueps |
| Sanitary Engineering |
| Structural Orafting | Cotton Manufacturing Loom Fixing C flayer Mig. Refrigeration, Domestic Air Conditioning
Plumbing Textile Engineering Woolen Manufacturing Highway Engineering Reading Structural Blueprints Senitary Engineering Business and Academia Courses Steam Filling Metal Accounting CAS
Bookkeeping Susiness Administration
Business Administration
Business Correspondence
Cartine
Cortified Public Accounting
Commercial Ci Comm □ Advertision Aprenautical Engineer's, Jr.
Aircraft Draiting & Design
Aircraft Mechanic
Engine Machanic Structural Engineering
Serveying and Mapping Communications Courses ☐ Electronics Practical Telephony
Radio, General ☐ Hadio Operating ☐ Tool Designing ☐ Carloueing Automotive Courses □ Automobile Aufo Tochnicion Radio Servicing Cost Accounting Fashion & Book Hustration ☐ Telegraph Engineering Auto Electric Technician Railroad Courses Fashion & Bo
Federal Tax
Feremenship ☐ Air Brake Auto Body Rebuilding & Rollnishing Car Inspector Electrical Courses First Year College Diesel Locomotive
 Lecomotive Engineer
 Locomotive Fireman
 Locomotive Machinist C Electrical Drefting Chemical Courses Foremenship Sectrical Engineering Chemical Engineering Good English
Higher Mathematics High School C Bectric Light and Power Chemistry, Analytical
Chemistry, Industrial
Food-Plant Sanitation Lighting Technician
Practical Electrician | Industrial Supervision | Motor Treffic ☐ Railroad Section Forement Steam-Diesel Locamplive Eng. Personnel -- Labor Relations

Postal Civit Service Patroleum Refining □ Pleatics Diesel Engines Courses Pulp and Paper Making ☐ Diesel Engines ☐ Retailing Stationary Engineering ☐ Internal Combustion Engines Courses Retail Business Management Civil Engineering and Power Plant Engineering ☐ Secretarial Mechanical Courses Architectural Courses Salesmanship | Foundry Work. | Stationary Fireman Intals | Stationary States Engineering Architecture | Architectural Drafting | Forging Sign Lettering
Traffic Management ☐ Siamography ☐ Bridge and Building Foreman ☐ Heat Treetment of Mataix .Home Address ___Working Houry._____A.M. fp_ ____Employed by ___ Special testion cates to members of the Armed Forces. Canadian residents send coupon to International Correspondence Schools Canadian, Ltd., Montrest, Canada.





Picture Features

Doughnut Proposed as Space Station120
5 Don'ts for Drivers134
They Built a Blimp for Fun154
GI Truck Gets Automatic Drive158
Mechanics & Handicraft
Father and Son Build Hot Rod118
Stethoscope Spots Car Noises187
What's Inside a TV Doghouse218
How to Sharpen Circular Saws235
Depertuents
Departments
Letters
Letters14
Letters

You Are "In" This City



Families that read POPULAR SCIENCE MONTHLY own 970,000 automobiles—280,000 more than are owned by all of the families in New York City. These figures inspired Robert R. MacGuire, a New York artist and craftsman, to build this make-believe city. It took several thousand copies of POPULAR SCIENCE to do it—a fraction of the more than a million copies distributed every month.

Your voice in Davy Jones' locker

To strengthen voices in the newest submarine cables between Key West and Havana amplifiers had to be built right into the cables themselves. With the cables, these amplifiers had to be laid in heaving seas; and they must work for years under the immense pressure of 5000 feet of water.

For this job, Bell Laboratories engineers developed a new kind of amplifier — cable-shaped and flexible, with a new kind of water-tight seal.

To serve far beyond reach of repair, they developed electron tubes and other parts, then assembled them in dust-free rooms.

The two cables — each has but two conductors — simultaneously carry 24 conversations as well as current to run the electron tubes.

With these deep-sea amplifiers, submarine cables carry more messages . . . another example of how research in Bell Telephone Laboratories helps improve telephone service each year while costs stay low.

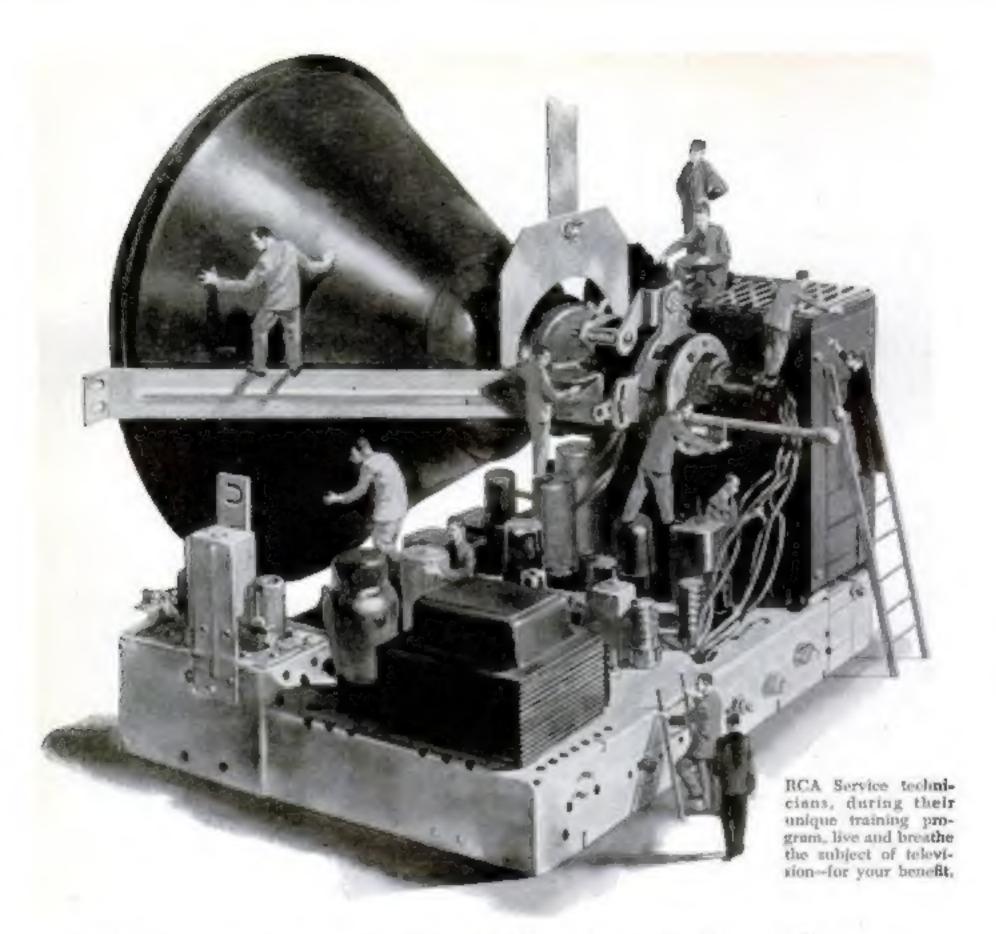
BELL TELEPHONE LABORATORIES

 Exploring and inventing, devising and perfecting, for continued improvements and economies in telephone service.



Cutoway view of deep-sea amplifier. Tubes and other elements are housed in plastic cases then exclosed in interleaved steel rings in a copper tube. Glass tape, armor wire and impregnated fiber complete the sheath.





These men get TV's Inside Story

When you buy a quality television receiver, correct installation and maintenance are as important as the set. For service technicians, RCA has developed the only training program of its kind—a factory program.

During their studies, these men learn the basic facts of modern, all-electronic TV...how it reached its present perfection by research at RCA Laboratories...how to build a receiver...how to select

and install the right antenna for your home...all the complexities of kinescopes, electron guns, TV cameras and transmitters.

When their studies have been completed, they have a grasp of television's inside story that assures you the most perfect installation and maintenance possible—under your RCA Victor Factory-Service Contract.

See the latest wonders of radio, television, and electronics at RCA Exhibition Hall, 36 West 49th St., N.Y. Free admission. Radio Corporation of America, RCA Building, Radio City, N.Y. 20.



Get all the performance that's built into your new RCA Victor home television receiver through an RCA Victor Factory-Service Contract.



RADIO CORPORATION of AMERICA

World Leader in Radio - First in Television

Exclusive for Ford Owners!

BUY AUTHORIZED RECONDITIONED

at a real saving!
Warranted by Ford
Authorized Reconditioners!

When it's time for new brakes on your faithful Ford, here's the way to do the job at a saving! With AUTHORIZED Reconditioned Ford Brake Shoes, you get efficient, long-lasting braking power!

—and you save a great deal of money!

AUTHORIZED Reconditioned Ford Brake Shoes are superior in many ways to overhauled shoes:

 their quality is superior. (AUTHORIZED Reconditioned Ford Shoes are completely stripped, cleaned and jig tested to print specifications)...

 they are lined with Genuine Ford Brake Linings (on highways and test tracks, Ford linings are given 3,250 emergency stops before acceptance) . . .

 they carry the AUTHORIZED Reconditioner's warronty assuring the same high quality as a new shoe (all brake shoe parts meet original factory specifications).

And here's another important fact—all shoes are rebuilt in the plants of Ford-authorized, Ford-inspected Reconditioners. Only brand-new Genuine Ford Parts are used! If you're not sure of your present brakes, let your neighborhood Ford Dealer give your car a brake shoe

inspection. He can spot trouble before your brakes give out.

Save dollars, too, with other AUTHORIZED Reconditioned Ford Parts . . . Carburetors . . . Fuel Pumps . . . Distributors . . . Voltage Regulators . . . Generators . . . Starting Motors! All carry Reconditioner's warranty.

on the engine or reconditioned parts you buy. It's your assurance of the AUTHORIZED Reconditioner's warranty against defects in material and workmanship for 90 days or 4,000 miles (whichever occurs first).

THE BIGGEST
RECONDITIONED "PART" OF ALL!
An AUTHORIZED Reconditioned
Ford Engine has over 150 new or
completely reconditioned
Genuine Ford Parts . . . gives
you new-engine power

for about half the cost of a new engine!

Stop Rust, Scale, Dirt With FRAM Radiator & Water Cleaner



ENDS Major Causes of Costly
Overheating to Save Motorists
Millions Every Year

SENSATIONAL NEW FRAM Radiator & Water Cleaner filters out foreign particles! Inhibits rust and corrosion! Softens the water to prevent scale! Harmless to antifreeze or other radiator chemicals.



\$100,000,000 A YEAR is wested on repairs caused by faulty cooling systems . . . warped valves, frozen rings, ruined radiators, cracked beads and blocks. Protect your engine and your pocket-book with Fram.

RUST, SCALE, DIRT are trapped inside the economical replacement cartridge. This cartridge, which contains softener and inhibitor, can be easily changed with a twist of the wrist.



FITS CARS, TRUCKS AND TRACTORS . . . See your Fram Dealer, You don't risk a red cent. The new Radiator & Water Cleaner is unconditionally guaranteed.



Only

\$9.85

FRAM CORPORATION, Providence 16, R. I.
In Canada: J. C. Adams Co., Ltd., Toronto, Ont.

World's leading manufacturer of oil, air, fuel and water filters for the automotive, aeronautical, marine and industrial fields.



Call Western Union by number and ask Operator 25 for the name of your nearest Fram Dealer,

POPULAR SCIENCE

Let me send You FREE PROOF

that you can become an expert

ACCOUNTANT...BOOKKEEPER

OR C.P.A.

FREE SAMPLE LESSON

I offer you this free sample leanon so that yourean proceto yourself that you CAN master Accountancyquickly, thoroughly-in space time at home.

You will see exactly how La Salle's famous "Problem Method" works . . how you are led step-by-step through artual accounting worklearning by duting and not by study of thency alone. birst you tackle casy problense, then more difficult ones-until soon you mester. them all. And at every stepyou have the close personal guidance of Labelle's large staff of C.P A. Instructors.

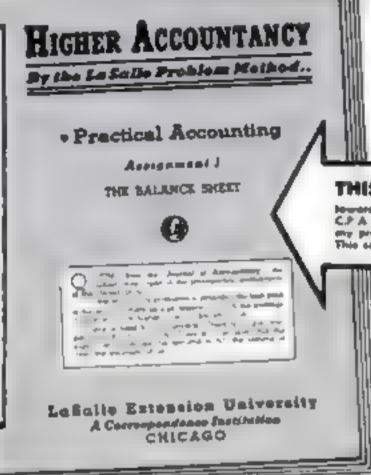
. Nearly 10% of all C.P.A.'s in the U.S. have been trained by the LaSalle Problem Mothed :

GOOD-PAY JOBS IN 5 BIG FIELDS

If you were an expert accountant right now, chances are you would find yourself emong the highest-paid of all professional men and women. Surveys show that accountants carn more than those in other major professions.

There are five big fields of opportunity bpen to Accountancy-trained men and women . . . opportunities that are wide open and highly inviting, offering maximum income and job security to good times or had. And under LaSalle's "Problem Method" you can start earning while atili learning -either in spare-time or fulltime employment . . or in business for yourself with no capital required.

Get the latest information by sending for our 48-page book, "Accountancy, the Profession That Pays". . . plus free sample lesson. The coupon at right will bring both to you without cost or obligation. LaSaile Extension, 417 S. Dearborn St., Chicago 5, Ill.



THIS SAME LESSON STARTED ME

LOWILL C. DOAK CPAINEA

Director of

de Accomite Instruction

boward a well-paid public accounting agreemend my

> IF you have been envying the high incomes and good jobs enjoyed; by thousands of men and women Accountants today . . . incomes ranging from \$4,000 to \$10,000 and more per year . . . why not launch such a career for yourself?

Do you doubt that you can?

Then let me send you-without cost or obligation—the same Lesson Number One with which LaSalle has started several hundred thousand

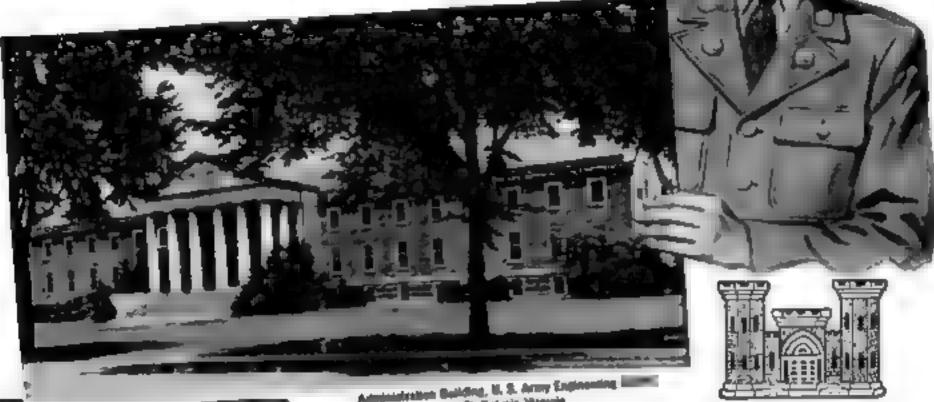
men and women toward successful accounting careers. I want you to see for yourself how this remarkable method, originated by LaSalle, makes Accountancy simple, interesting, practical, and certain ... how it leads you step-by-step to a complete mastery of Accounting-and on up to the coveted degree of Certified Public Accountant of you so aspire.

It doesn't matter whether you've had previous bookkeeping experience, or whether you don't know a debit from a credit. Whether you wish to qualify as an expert bookkeeper, advanced accountant, cost accountant, auditor, government accountant, income tax specialist, or public accountant . . , you'll find in LaSalle's Problem Method the exact plan to prepare you rapidly and mexpensively—in space hours at home-without losing a day from your present job.

So right now, today . . . if you are an adult, employed, and earnestly ambitious for rapid advancement in this highest-paying of all professions name and address to me on the coupon below. I'll send the free sample lessonplus our 48-page book outlining today's career opportunities and how you can qualify for them. A coupon like this has started many thousands toward greater success. It can do the same for you. Mail it today!

City Courses Mail TO	DAVI
LaSaile Extension University A Correspontation University A Correspontation University A Correspontation of the Problem & Test Mr. DOAK, I want to see how LaSaile's "Problem & qualify for high-pay Accountancy positions. Also, send your the Profession That Pays", all without out or obligation	espondence institution llinois Kethod" works bow Form
Name	





A FEW ARMY-TAUGHT TECHNICAL COURSES

AUTOMOTIVE MAINTENANCE

MINICAL EQUIPMENT

LOCOMOTIVE EXPAIRMAN

ELECTRICIAN

TIRE REBUILDER
TELETYPE REPAIRMAN
MAP REPRODUCTION
SUBGICAL TECHNICIAN
LEADERSHIP COURSE

CONSTRUCTION MACHINE

OFFRATOR
WATER SUPPLY TECHNICIAN

-And Many Others



Thousands of intelligent young men are needed now to attend the Army's enlisted technical schools and learn vital, interesting jobs. This chance is waiting for you, too, if you move fast while there's still a need for technically trained men. Typical of the Army institutions is the Engineering School. Here, soldiers graduate into many different engineering fields, from surveying to bridge-building.

Aptitude Tests—When you enlist the Army will test you to find out the field you're most suited for. You'll then be assigned to learn under the world's finest instructors and develop your special skills. When you graduate, you'll find opportunities for promotion waiting—and you'll proudly wear the uniform that's "the mark of a man." Get the facts at your U. S. Army and U. S. Air Force Recruiting Station.

U. S. ARMY



Be a success! PREPARE yourself—the easier way at COYNE, Whether 16 or 50, start training now for a job with a real future in ELECTRICITY or TELEVISION-RADIO, Learn from State-approved instructors—who have worked on the job themselves. Train where thousands of successful men have been trained for over half a century. Established in 1899. Get a Coyne diploma when you graduate . . . a sign of recognition.

NOT "HOME STUDY" COURSES

You learn quickly, the most practical way at Coyne . . . on real equipment. Experienced instructors show you how. No advanced education or previous experience needed,

Start Now-Pay Later-Small down payment starts you-balance in easy payments later. If you need part-time work to help meet living expenses while at Coyne, we'll help you get it. Courses ap proved for qualified relevant.

TRAIN NOW FOR A VITAL JOB IN INDUSTRY OR HIGHER RATING AND DETTER PAY IF DRAFTED

ELECTRICITY, TELEVISION, RADIO and ELECTRONICS play a vital role in Nation & Defense program, Uncle Sam needs thousands of men in and out of uniform who are trained in their fields So does Industry, And these jobs are just as necessary after the present emer-gency, Electricity and Electronics

are big opportunity fields under all conditions. Television Radio is a newer field that is growing after wild fire Government is about to author-ize hundreds of new TV stations Send for Big Free Book and facts about how you can prepare quickly for these great opportunity fields. Send coupon today.

B. W. Cooks, President

COYNE ELECTRICAL & TELEVISION-RADIO SCHOOL

500 S. Paulina St. Dept. 71-73H Chicago 12

Got Big Gree Book Today

If you want to get ahead learn either of these two vital fields . . . be a success - SEND THE COUPON BELOW, for big, illustrated Coyne book. Mail it today —facts by return mail. No salesment will call.

B. W. Cooke, President



COYNE ELECTRICAL & TELEVISION-RADIO SCHOOL 500 S. Paulina St., Chicago 12 Dept. 71 73H

Send you	BIG F	REE	BOOK	and	details	of
your training	g offer.	1 am	Interes	Led	in	
□ ELECTR	ICITY .		ELEVI	isto:	N RAD	ΙŌ

	4 Percent	TO A PURE	254 h	ADIO
NAME				
A WITE OF BELLE.	\$* +++ -0+++ -1++++ rds	 	+ +	e '- skunddel
ADDRES	22			

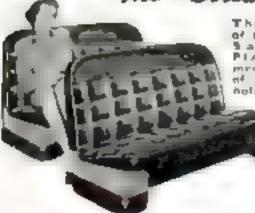
CITY STATE.





Genuine fibre seat covere plants plants plants plants plants plants plants of the plan

The "Streamlines"



The multi-colors of this genuine har an Waven Plastic complement the colors of the cars up-holstory. The finest you can

buy, Baran Weven a Platte is impervious to commit conditions. Song proof. Waterproof. Flame reaustant,

RUSH NAME TORM FREE

Sive Make, Year and Madel of Your Car

Anyone working full or space time can realize his money. No need to more her prosperts. Every car owner is one. Make year amund NTEADY PROFITS. Get free feiling hit at once, ACTUA! SEAT COVERS GIVEN FREE TO PRODUCERS FOR OWN USF. Write for full details—or mad coupon below—ToDAY!

KEY PRODUCTS CORP. 400 No. Clark St., Dept. e-S. Chicago JQ, IIL. Tou're heard of the tremendous demand for Leopard auto sent covers that built up overnight from one end of the country to the other. Car own ers are paying \$30.00, \$60,00 and \$70.00 and more for car seat covers with Leopard design. Now you can serve that eager demand at a fraction of the cost your customers would expect to pay! No wonder salesmen are making money hand over full with this sense local new key Seat Cover line!

Make big money daily. Take orders from car owhers everywhere. Permanent pair around income. Meet and best all competition with opvers cut to accurate patterns like the finest suit of clothes. Slick, wrinkle-free fit adds an accent of elegance to any car. . . . Just like an original upholstery job! CASH IN ADVANCE DAILY. Direct-from-factory low price. Customers expert to pay twice as much as the law price you quote for these genuine, expertly to lored Auto Feat Covers. Your customers instantly recognize the real bargain you are offering? And you make top profit on each sale! Earnings in advance every day!

SALES KIT

Mathing of all to buy Complete sales bit including actual samples of materials and a brim, Leopard clark places, leach crafts, stc. Beautiful illustrations. Big separt of COD order taking forms. Everything you need to start cashing in termoduplety. Got in on this because business. Write for solling bit, including forms. Other of PRIS Seat Covers for your Own car.

ALL FREE!

KEY PRODUCTS CORP., DEPT. 4-5 800 N. CLARE STREET, CHICAGO 10, ILLINOIS
Rush me Free Sample Outfit at once so that I can start making real money with Key Products. (If you own a car include the following information).
MAKE OF CARYEAR
MODEL 2 Door 4 Door
NAME
ADDRESS
PPY STATE

FOR THE F YOUNAN AMERICAN SCHOOL, Down. G Without obligation, pl Without obligation, pl the subject checked below	746, Drewel of 58th, Chicago 3: sease send FREE and postpaid sease send FREE and postpaid Trades	d, full particulars about Plustics Engineering Plumbing—Practical Private Secretary Refrigoration
Accounting Air Condition Architecture & Building Architecture Technician Automative Technician Better Foremanship Bookkeeping Business Management	Electrical Engineering Electrical Engineering Electrical Fractical Electronics—Industrial Electronics—Industrial High School Courses Nachine Shop Operations Nachine Shop Operations	Retrigoration Retail Merchandising Retail Merchandising Selesmonship—Outside Selesmonship—Outside Selesmonship—Outside Tool Merchandising CCUPATION AUE
Diesel Technicien NAME HOME ADDRESS. CITY		STATE

Check the career that interests you most, Fill in spaces and mail at once—no obligation

Today, choose the job you want - and prepare for it in spare time at home. Or if you are already engaged in the work you like best, start training now for quicker promotion. In hours you might otherwise waste, gain the knowledge and skill that can help you to get ahead faster, make more money, and have greater security.

Thousands before you have followed this plan and were able to step out ahead of others who didn't fit themselves for advancement or who seemed willing to trust to luck.

Training Backed by 54 Years of Experience

For over half a century American School has helped ambitious men and women

toward success by providing specialized training for commercial and technical advancement. At a cost you can afford you can prepare at home to climb in the kind of work you prefer. American School's study program for you has been planned by experts with years of experience in the subject you select and they will give you needed guidance every step of the way.

Don't Delay Your Start

Give serious thought to the list of training courses listed above. Pick the opportunity that interests you, check it and add your name and address. (Check more than one if you are undecided as to which appeals most.) Finally clip out and mail the "ballot" and full information will be supplied, without cost or obligation.

FPRACTICAL STREETERS DEVELOR WITH METERS THAT WIND A SENCE TESTS 975

AMERICAN SCHOOL, Dept. G746, Drexel at 58th, Chicago 37, III.

THE SOONER YOU START, THE SOONER YOUR GOAL CAN BE REACHED



free folder tells how

TELES HOW TO BUILD YOUR FIREPLACE-Step by Step

- Poundation
- · Steel heat-circulating form
- · Cold and warm air dues
- · Chimney and flue construction
- · Mantel or decorative front

ASK FOR BOOK "100 PIREPLACE IDEAS"

Beautiful fireplace designs modern and conventional—shows artistic use of available material.

Enjoy circulating hear and the radiance of an open fire in your Home, Playroom, Cottage or Camp.





Fireplace form

net on foundation

Foundation

Brick, stone or coment block can be used around the form.

	Send free directions for building heat-circulating fireplace. Send Book "100 Fireplace Ideas," Pocket size book, sent free Send larger book, 8½ x 11, benutifully illustrated, 25c. Send outdoor fireplace folder with 10 benutiful designs Free.
Name	page amagéments 1105005 (55 magamenters) budos 100000 magamenters (40005 magamenters)
Street	**************************************
	* *************************************

PRICE FIREPLACE NEATER & TANK CORP.

Letters



Bike Hitches Car Ride

Why the "bicvcle" wheel on the back end of the Cadillac shown in the picture on bottom of page 49 in July? Presume it is some testing device, but what for?

JOHN HOWARD, Seattle

See page 126.

PS Joins the Navy

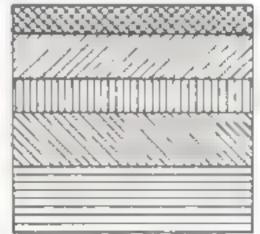
I have been a POPULAR SCIENCE reader for a number of years, in fact, I have retained all of the issues since 1943 excepting two. What impresses me the most is the variety of articles to be found. I feel that PS has helped to create and develop my interests a hundred-fold.

HOWARD J. WILSON, Department of Defense Office of Naval Research, Washington, D. C.

Getting Back on the Road

This is with reference to your article in the July issue regarding the New Jersey Tumpike.

The cross section of the highway as shown in the top right-hand corner of page 74 is a little different from the one we are using. For your information, topsoil is only used in the area that is to be seeded.



4 2 ASPHALT CONCRETE

7 2 ECOURSES

62" FUB BASE TYPE "D"

54 SUBGRADE MATERIAL

1' 0" EL STING SUBGRADE

I am enclosing a Tumpike cross section [above] which shows a one-half section of the New Jersey Tumpike as built in Section 2.

JOHN A. McFARLAND Ass't Resident Engineer Gannett Fleming Cordry and Carpenter, Inc. Barrington, N. J.

Thanks to Mr. McFarland for giving us the latest data on the paving, which is now

INVENTORS

Learn how to protect your invention. The U. S. Patent Laws provide that any new and useful art, machine, article of manufacture, or composition of matter, or any new and useful improvement thereof, may be patented if the act of invention is involved. Therefore, every inventor with a valuable invention should take advantage of the Patent Laws and proceed for patent protection in order to safeguard his rights.

A patent gives the inventor the exclusive right to prevent others from making, using, or selling the inventon claimed in the patent for a period of seventeen years.

The Patent Laws were enacted for the benefit of the inventor to give him protection for the features of his invention which are patentable. These features must be properly and concisely set forth and claimed in a formal application for patent, in order to comply with the requirements of the Patent Laws. For that reason, unless the inventor is familiar with patent matters, he should engage a competent registered patent attorney or agent to represent him. We are registered to practice before the U. S. Patent Office and are prepared to serve you in the handling of your patent matters.

A specially prepared booklet entitled "Patent Guide for the Inventor", containing detailed information with respect to patent protection and procedure, together with a "Record of Invention" form will be promptly forwarded to you without obligation upon request.

CLARENCE A. O'BRIEN & HARVEY JACOBSON

Registered Patent Attorneys

12-K DISTRICT NATIONAL BUILDING WASHINGTON 5, D. C.



Hobbyists delight in results made possible by Weldwood Glue, Firsite and Saturlac. Ask for these magic hobby-aids at hardware, paint and lumber dealers, or mail coupon below for free leaflets.

Newer than Shellac or Varnish



Pints, Quarts, Gallons

For "natural wood" finishes on furniture, panelling or woodwork, there's nothing like Satinlac, Brings out natural grain and color beauty of any plywood or solid wood. Avoids that "built-up" look; will not turn yellow or darken with age, "Water-clear," easy to brush or spray, dries ready for next coat in 2 or 3 hours.

Glue That's Stronger than Wood



To make things or fix things, use Weldwood Glue for all wood to-wood bonds. Makes joints stronger than the wood itself. Mixes easily with water. Stainfree, rot-proof...highly water-resistant?

METDMOOD_®

A MUST for Finishing Fir Plywood



Tame that wild grain with FIRZITE. Virtually prevents grain raise or checking... readies the surface satin-smooth for paint, stain or enamel. (For blond, pickled, or tinted effects on soft or hard woods, use White Firzite).

FIRZITE

*Trade Marks

7	United States Plywood Corporation,
	Dept. 319, 55 West 44th St., New York 18, N. Y.
	Send me free leaflets on Weldwood Glue, Firzik and Satinlac.
	NAME
	ADDRESS

being put in place on the New Jersey Turnpike. When George Waltz and Bill Morris
gathered the information and photographs
for the July story, the paving operation had
not yet begun. Also, the roadbed varies
somewhat from section to section. Thus the
discrepancies in the thicknesses of the various layers. The label "Top Soil," however,
was a typographical error. It should have
read "Top Base," according to information
received at that time

Asked for It-Got It

In your June issue on page 143, Mr. E. R. Whitney "Would Like to See Them Make" a rubber molding strip for car doors.

I am enclosing a photo [below] of our rubber molding installed on a Packard. This



item has been on the market for about two years, sells for \$1.00 per set of two strips, and can be applied to practically 95 percent of the cars now in use.

RAY A. BRAINARD, West Hollywood, Craft Shop, Hollywood, Calif.

Could Anyone Heip?

I have just obtained a 1923 Jewett sedan and would like to locate a service manual or other information that would help me restore it to good condition.

WILLIAM PENNANAN, 531 N. Main St. Rochester, Mich.

Well Traveled Piston: Well Split Hair

Those Wilbur Shaw "Reports from the Driver's Seat" are swell. But I've noticed something funny in the fact boxes giving

INVENTORS

If you believe that you have an invention, you should find out how to protect it. The first step is to have a search made of the prior pertinent U. S. patents. If a report on this search indicates that the invention appears patentable you can apply for a patent, and the specifications and claims should be prepared.

The firm of McMorrow, Berman & Davidson, with offices in Washington, D. C., is qualified to take the necessary steps for you. We can make a preliminary search on your invention, advise you whether we think it can be patented, and prepare your application for patent.

Unless you are fully familiar with the U. S. Patent Laws, we recommend that you engage the services of a Registered Patent Attorney to protect your interests. The patent laws are your laws. A patent gives you the right to prevent others from making, using or selling the invention claimed in your patent for a period of 17 years.

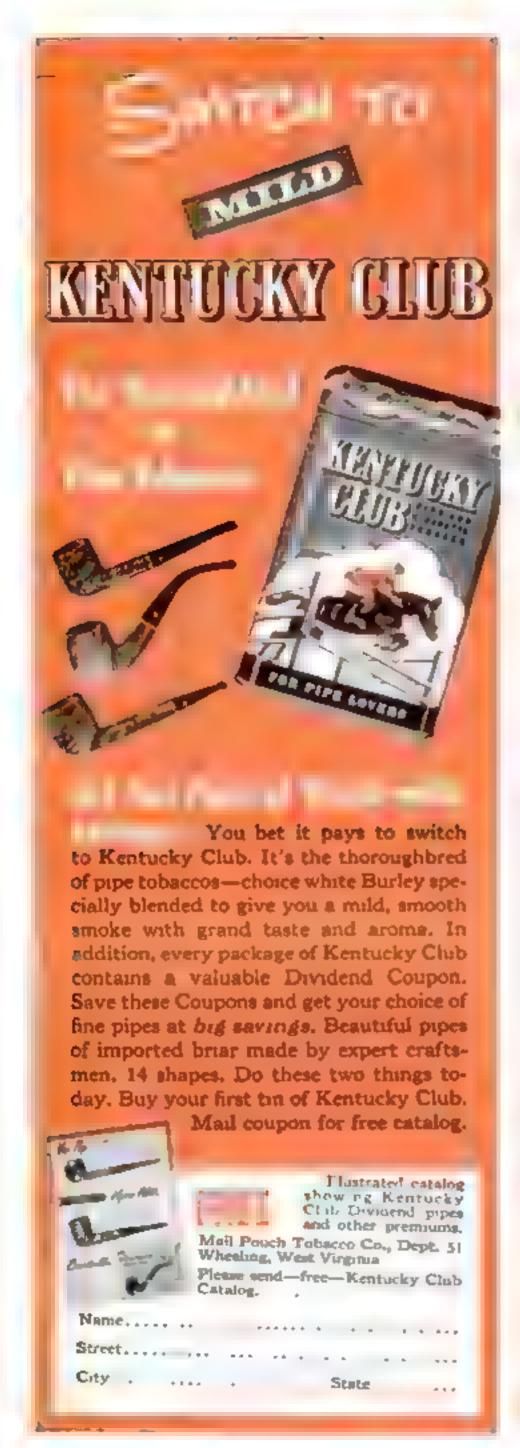
Use these patent laws for your protection. Investigate whether your invention can be patented. If you have what you believe to be an invention, we suggest that you have this firm make a search for you.

Send for a copy of our Patent Booklet entitled "How To Protect Your Invention," containing information about patent protection and patent procedure. Along with this we will also send you an "Invention Record" form, for your use in writing down and sketching details of your invention. We will mail them promptly. No obligation. They are yours for the asking.

McMORROW, BERMAN & DAVIDSON

Registered Patent Attorneys

PATENTS - COPYRIGHTS - PATENTS
142-Y VICTOR BUILDING, WASHINGTON 1, D. C.



new-car specifications. Sometimes you use the heading "Piston travel (in feet per car mile at 20 m.p.h.)."

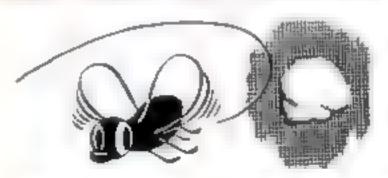
I know that piston travel per car mile in high is a useful figure to know, since it's a way to estimate the rate of engine wear and hence time between overhauls. But why in the name of good sense do you specify "at 20 m.p.h."? It doesn't make a blessed bit of difference how fast the car is going. The piston travel per mile is just the same if you're going 20 or 80.

CLARENCE HOLME, Portland, Me.

Speed makes a difference. The reason, of course, is that centrifugal force varies the effective diameter of the rear wheels. According to a test engineer for a major Detroit manufacturer, 6.00 by 18 tires have a diameter of about 27 inches at west under normal load and inflation. To cover one mile, they must turn 747 times. But traveling at 80 m.p.h., the tires "grow" in effective diameter by 19/64 inch. Thus they can cover the same mile in only 738 turns, about nine turns less. Therefore, given a rear-axle ratio of 3.9 to 1 and an engine stroke of 4% inches, a piston will travel some 25 fewer feet per mile at 80 m.p.h. than at a very low speed. That's a reduction of slightly more than one percent.

The Great Cotton Mystery

I disagree with the U.S. Bureau of Entomology's statement that a wad of cotton on



a screen door is of no use in keeping flies away [PS, Aug., p. 8]. I have found it 85 to 90 percent effective.

J. D. MACK, Eneino, Calif.

... The flies think the cotton is a spider web and stay away.

P. H. LOGAN, Calhoun, Ga.

... They mistake it for a giant white moth which is their deadly enemy.

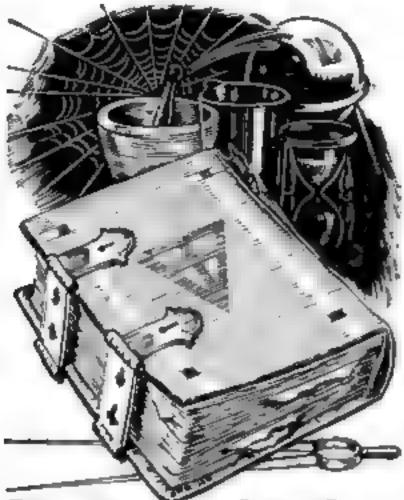
EDW. L. MEAD, University City, Mo.

the cotton with DDT on it. Then it works.

F. V. SPENCE, Norwood, La.



SECRETS ENTRUSTED TO A FEW



The Unpublished
Facts of Life-

THERE are some things that can not be generally told—things you ought to know. Great truths are dangerous to some—but factors for personal power and accomplishment in the hands of those who understand them. Behind the tales of the miracles and mysteries of the ancients, he centuries of their secret probing into nature's laws—their amazing discoveries of the hidden processes of man's mind, and themastery of life's problems. Once shrouded in mystery to avoid their destruction by mass fear and ignorance, these facts remain a useful heritage for the thousands of men and women who privately use them in their homes today.

THIS FREE BOOK

The Rosicrucians (not a religious organization), an age-old brotherhood of learning, have preserved this secret wisdom in their archives for centuries. They now invite you to share the practical helpfulness of their teachings. Write today for a free copy of the book, "The Mastery of Life." Within its pages may lie a new life of opportunity for you. Address Scribe A.G.Y.

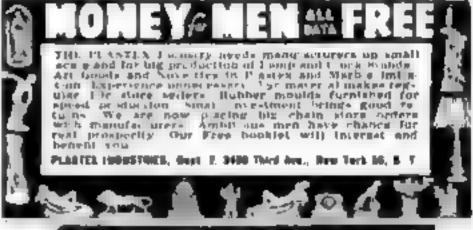
The ROSICRUCIANS

(AMORC)

San Jose

California, U S.A.







Dept 1910 D. Flegsont Hill, Ohio

BROOKS

can make a cureer for YOU

LEARN INVESTIGATIVE PHOTOGRAPHY LEGAL—CRIMINAL

Secoring evidence through bullistic photos, fingerprints, scenes of accidents and colors is interesting a profitable

As Brooks lessituse, you learn by doing. You use the finest up-to-date equipment and you retrained by instructors, each an expert in his field Brooks is the only recognized photographic school offering this opportunity to leath legal and criminal photography.

Opportunity knocks - with the click of a shutter Start your Investigative Cover by invest-

igating today . . Write for our FREE booklet and full information.



SANTA BARBARA - CALIFORNIA

Where the mountains ment the sec."





Lockheed is building planes for defense, planes for the world's airlines. It's all part of our long-range product on program—a program that means a better job, better future, a better life for you in California

Lockhead needs: Machinists Tooling Men Engineers

Experience in aircraft production is not needed, your akid can be adapted to tock heed a type of work

Lockheed offers you. Too wages, travel allowances to be paid after six months employment at Lock heed, retirement plan, group insurance and many other benefits, regular job ratings for promotion

Middle-age is no barrier to a job at Lockheed; skill and ab lity not years, count here

Nate to Men with Familias:

Housing conditions are excellent in the San Fernando Valley, the home of Lockheed Huge tracts are under construction. Thousands of homes have been built since World Wer if The school system is eplended

Write today for lob application black, illustrated brochure describing life and work at Lockheed in California, and full dejails on your opportunity at Lockheed. State your type of work. Use handy coupon below

LIFETIME WRITTEN GUARANTEE ALSO FAMOUS WERE UP TO

559.50 **SAVE 542.88**

WALTHAM or ELGIN Wortches

Now you can save up to \$1" 35 on a gen-Gone Hujota Benedi Graen Wa hum. E gin of other famous make wrist watches in the artest it; se Yelinic Gold cope. You (beec unredeemed LIFETIME 61 ARANTEDD watches at this sening t month low price because we bought out 8) RPI I S STOR KN of lending New York and M.I. Jewelers, Order now wildle they last? Specify make preferred and whether men a or Ind es Onis \$16.85 p.m. \$1.70 tax.

TRIAL OFFER! WEAR

Wear any of our guaranteed watches for 10 DAYS FREE TRIALI If not delighted, full refund will be made at once)

THE Standsome expansion band the uded PILE with your parties and second (N) so down partners my balance per-times plus postage on arrival Or who one full payment plus (and its rester and we pay postage

MARYLAND DISTRIBUTORS, Dept. 297

501 East Baltimore Street Baltimore 3, Md. WRITE FOR PREE WATCH AND DIAMOND HING CATALOG - PRACTICALLY WHOLESALE PRICES.



Wheels

Tire 5/16" or 3/ Tire 5/16" or 3/ "Tire 3%" sleeve "Tire 3%" sleeve 45c 84. 70c +4. 80c +4. 50 +8. 10 es. prices includes hub esqui

UNITED WHEEL STAMPING CO.

TASOPE PHOTO-ENGRAVING PLANTS



Establish your own profitable PHOTO-IN-GRAVING business. Make cuts for newspapers printers, and advertisers. Make atched name plates, plaques etc. Instructions furnished, no experience necessary, Sold direct from factory since 1931. First five hundred cuts sold locally or by mail will pay for plant and pay you well for your time. Write for FREE cotales. TASOPE DEPT. PS-10, AURORA, MO.

Develop Hidden Earning Power

SIUDI LA

at home! LL.B. Degree

Qualify yourself in spare time for advancement, greater earnings, business success. Now, more than ever, legal ability is in demand! Easy-to-understand step-by-step lessons and text material furnished—invaluable for permanent reference, 42 years expert teaching, 114 000 students enrolled, Easy payments. Find out now, at no cost, how study of law can help you. Write today for FREE Book "Law and Executive Guidance.

AMERICAN EXTENSION SCHOOL OF LAW

Dept. PS-43 646 N. Michigan Ave.

WILL YOU BE CLIMBING?

o_R

WHAT you'll be doing one year from today depends on what you do today.

Take advantage of today's opportunities and you're sure to move ahead. Put off doing anything about them and you chance being left behind.

The opportunities open to trained men are greater today than at any time in the past five years. Skilled technicians and specialists are the men of the hour. And thousands of them are I. C. S. students.

Start now! Study at home, in your spare time, with the world's largest school—I. C. S. Mail the coupon today for full information. It may be later than you think!

STUCK

INTERNATIONAL CORRESPONDENCE SCHOOLS BOX 7690-M, SCRANTON 9, PENNA. Without cost or abilipation, placap acord my hull perficulars about the course MESORE which I have marked K; Structural Drafting
Structural Engineer
Sarraying and Man Business and Academic Courses C Autorath Meckanic Machanical Engineering Mold-Loft Work Engine Muchenic Structural Engineering Air Canditioning and Plumbing Courses Accounting Bookkeeping C Advertising Patternmaking-Wood, Matel Surveying and Happing Communications Courses C Reading Shop Blueprints
Shoel Metal Drafting
Shoel Metal Warker ☐ Heating □ Business Administration Electronics | Practical Tolephony Radio, General | Rodio Specatio Air Condil Air Conditioning Burness Correspondence C Rusin Operating Ship Fiffing Redu Setricing Ship Drafting Tool Designing Business Lew Refrigeration Carlonning Certified Public Accounting Refrageration, Demissite Televerane Telegraph Engineering Electrical Courses counting | Refrigulation | Countries Art | Steem Fitting Refrigeration & Air Conditioning Welding - Ges and Electric Commercial Rattreed Courses Cost Accounting Fushion and Book Municiplicate Chemical Courses Electrical Drafting Au Brake Car Inspector Electrical Engineering Chemical Engineering Dresel Locamotive Federal Tax First Year College Chemistry, Analytical Electric Light and Powell Lacomative Engineer Chemistry, Industrial
Food-Plant Samilation Lighting Technician Practical Electrican Forumenship C Locomotive Firemen Good English C Lacomoteva Machinist retrolesso Production & WITH STREET, STATE OF STREET, PROGRAG ELECTRIC KEINIGE SECTION FORESTERN Industrial Supervision Pulp and Paper Ministry | Shop Electrician Plastica -Steem Diesel Locamotive Engineer Stationary Engineering Courses Motor Treffic Givil Engineering and Dissel Engines Courses Personnal - Labor Ralglions Architectural Courses Diesel Engines Architecture (*) Architectural Digiting (*) Bridge and Strikling Foremon O Power Plant Engineering Postai Civil Service | Retailing Internal Combestion Enginee Retail Business Management Machanical Course Stationary Fremun

Stationary Steam E ☐ Secretariel Forgong Heat Treat Stationery Street Engineering Togethe Courses Salesmanship Building Estimation Foundry Work Sign Lettering Cord Engravering rund of Metala Stenography (Traffic Menagement Contracting and Building Industrial Engineering Cotton Manufacturing Highway Engineering Asronautics Courses to destrial textramentation. Loam France 1 Rayen Manufacturing O findustrial Metallurgy

O Machine Shop O Mechanical Drafting O Westen Manufacturing Aeronauticai Engineer s., Jr. Aircraft Drafting and Design C Sanitary Engineering Storm Address. Working Hours... A.M. St. Present Position Employed by, Special builton rates to members of the Armed Forces. Canadism residents send cooper to International Correspondence Science Canadism, Ltd., Mostreet, Canada.

SCHICK INJECTOR WINS 5 TO 1 IN U.S. SHAVING TEST

USES FAMOUS "GOLD PACK" BLADES THAT GIVE FINER SHAVES THAN ALL OTHERS -INCLUDING OUR OWN OLD BLADES!



WORLD'S ONLY RAZOR with all these big advantages:

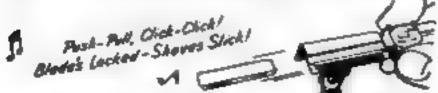
Blades change automatically-"lock" at same, precise angle-no adjusting ...

Light weight makes shaving easier! Safety-Bar smooths down skin . . . "Fits" face—around nose, lips . . . Uses new "Gold Pack" Blades!

*HERE'S FULL SCORE FROM SHAVING TESTS

Safer Shaves 7 to 1 Smoother Shaves 51/2 to 1 Faster Shaves 5 to 1 Cleaner Shaves 5 to 1 More Shaves per blade, nearly 2 to 1

 Men in 10 cities—nationwide—compared New Schick Injector Razor and "Gold Pack" Blades with whatever they had been using. About 80% of the men had a preference. Of these, the votes were in the ratios shown above. O1961 Eversharp Inc., 350 5th Ave., N. Y. C.



RAZOR and BLADES

Before you make any effort to market your invention, you should take the first steps toward proceeding for patent protection,

I shall be pleased to furnish you with information relative to patent procedure upon request from you, and this will be without any obligation on your part,

PATRICK D. BEAVERS

Registered Patent Attorney

937 Columbian Building, Washington I. D. C.

Send today for "Patent Protection for Inventors" outlining preliminary steps to take toward patent protection. also convenient "Evidence of Invention" Form.

VICTOR J. EVANS & CO.

ASSOCIATE EXAMINER U. S. PATENT OFFICE 1922-1929 PATENT ATTORNEY & ADVISOR U. B. NAVY DEPT. 1850 1847

Send for PATENT IMPORMATION Seek and INVENTOR & RECORD Without obligation





Whether an invention is patentable can be substantially de-termined by a search of the U. S. Patent records, Without obligation, write for information explaining the steps you should take to secure a patent

JOHN N. RANDOLPH

Registered Patent Attorney

205 Columbian Building

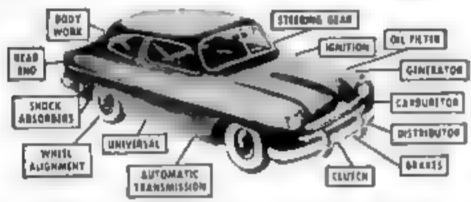
Washington 1, D. C.

IF YOU WISH TO PROTECT YOUR INVEN-TION, You should take steps to protect it by a U. S. Patent. Write me for "INVENTION RECORD" FORM

WOOLWORTH BLDG., 35th FLOOR, 101C NEW YORK CITY

I NEVER DREAMED THAT COULD BE A PUSHOVER!





MOTOR'S New AUTO REPAIR MANUAL Shows You Step-by-Step How to Fix ANY Part of ANY Car Built From 1935 to 1951

AUBERRY

'il fixed a mater in 30

minutes after another

mechanic had worked on

it half a day." - Q.

Murirees-

YES, It's as easy as A-B-C to do any "fix-it" job on any car - whether it's a simple carburator adjustment

or a complete overhaul. Just check the index of MO-TOR'S New | AUTO RE-PAIR MAN-UAL. Turn to

pages covering job. Follow the clear, illustrated step-by-step instructions. Presto-the job is done!

No guesswork! MOTOR'S Munual takes nothing for granted. Tells you where to start. What tools to use Leads you camly and quickly through the entire operation!

Over TWO THOUSAND Pictures! NEW REVISED 1951 Edineed to know to repair 800 car models. 771 giant pages,

> Same FREE 7-Day Offer On MOTOR'S Newest TRUCK & TRACTOR REPAIR MANUAL

For mochanics truck spe-For mochanics truck approval statements, service stations from the Court of the Cou by Armed Forces. For Trial check proper ben IL COMPOS.

2300 "This-Is-How" pictures.

Over 200 "Quick-Check" charts-more than 38,000 essential repair facts. Instructions and

pictures acc clear you can't go wrong!

Even a green beginner mechanic can do a good ... Job. this missed receive ual before him-

Henry J

Rudson

Lafayetto

Mercury

Mush Rumbler

Nash

Il you're a top-notch mechanic, you'll find efficient shop methods that will amaze you. No wonder this guide is used by the U.S. Army, Nevy, and hundreds of thousands of repair men!

Mout of Over 150 Official Shop Manuals

Engineers from every afte plant in America worked out these timesaving procedures for their own car line. Now MOTOR brings you thu wealth of "know-how" from over 150 Official Shop Manuals, "boiled down" into crystal-clear terms, protwely illustrated, in one handy indexed book!

SEND NO MONEY

When postman brings book pay him nothing. Pirst, make it show you what it a got' Unless you agree this in the greatest time-saver and workyou've ever seen -return book in 7 days and pay nothing Mail cou-port NOW! MOTOR Book Dept., Desk 210, 250 W. 65th St., New York 19, N. Y.

"MOTOR'S Manual sold for Hgelf on the first 2 jobs, and haved ove valuable time by etiminating guesawork."-W. BCHEOP, Dhie,



MAIL COUPON NOW FOR 7-BAY FREE TRIAL

Winter

ALSO tube ob

m garber organis for the district

MOTOR Book Dept., Desk 210 250 West 55th Street, New York 19, N. Y.

to me at oncer (Check how opposits book you want) motor & New Auto REPAIR MANUAL, If D & I will result \$1 to 7 days. (plus 35c de levry charge—then \$2 months for 2 months, and a final payment of 95c a month later Otherwise I will return took postpand to 7 days (Foreign price remit \$5 mah

moton's new TRUCK & TRACTOR SEPAIR MAN-UAL. Described at left (f O R f will resist \$2 in 7 days and \$2 monthly for 3 months plus 35c de-likery charge with first payment Otherwise I will rejurn book promptly (Foreign price result \$10 cash with noder.)

Print Address

Manto City & Zone No.

D SAVE 38c delivery charges by exclusing WITH COLPON cherk or money order (or full payment of \$5.95 for Auto Manual or \$8.00 for Truck Manual). Same 7-day return refund privilege applies

AND

NAVY

TV-Radio-FM Service Technicians in Big Demand! Get top pay faster through RTTA practical shop-training methods right in your own home. We supply everything.

AFTA Furnishes Every-

thing! Tubes, Batteries,

Large TV Picture Tubel

YOU BUILD AND KEEP

THIS GLANT SCREEN

Your choice of 10, 1214 or 161

Picture Television Tube

PULTITESTER

TELEVISION SET! -

WE PREPARE

TOU FOR

FCC

LICENSES U. S

00400

SIGNAL

GEMERATOR

B-TUBE

SAP 10



1 / 12 *

DAM A K F

After completing home atudy training, your transportation both ways from any point in U. S. or Cannda wall be paid by RTTA. You visit our affiliated fa-cilities in N Y C. as part of your 2 weeks of practical training on newest equipment at RTTA.

T to the Name of the Party of t N. C. C.

RTTA belps you earn while you learn! Open to men of all ages! RTTA prepares you for BIG PAY and to open your own shop.

DOVELY EVEN Pre-tal STRICT PART OF BUILDING TO THE PERSON OF THE PERSON HETCH PART YOU CAN



Radio Television Training Association 515 Gilnton Ave., Dept, 1510 Newark t, N. J.

Name

Approvat by Commissioner of Education of State of It. 1

at Home with New Kind of PAINT STRIPING TOOL makes it easy to do expert striping on furniture, biken, model planes, autos, aigns, toys linoleum wall board etc. Makes plant, painted walls ook like tile Paint straight lines curved POSTPAID circular or evenly spaced paradel hors

circular or evenly spaced parallel lines the same way a professional parallel lines (due). Simply fill Talentar I am I'alin Francisch parallel lines than with any color paint and wheel the feet to hi evenly Tips interdistratesh eliminar Tool complete with 16st 14st 25cd 66st 34st.

DEALERS Paint 14st 14st 15st and 15st and 1 tool and 1 tips 45cd and 1 tip

cu ar, a scounts

Just the tool you've been waiting for! New PAINT STRIPING tool gives professional" results every time, yet simple and easy to use us a founts a sec Adjustuble guids heape tires straight as an arrow. Just an easy to make curves of free hand designs. Adds now beauty and finished look to everything you maint. Send deltar today.

ATTENTION

Home Craftsmen

and Hebbyists

WENDELL MFB. CB., 4234 N. Lincola Ave., Dept. 216, Chicago 18, U.

More Local Plants Needed to Supply Growing Demand

More local plants are badly needed to make Dunbrik-



Dunstone - America's finest masonry Smart modern - colorful. Yet costs less than lumber. Millions used annually for homes, stores, factories, public buildings, etc.

> Write for pertfelia "Blueprints for Profit"



With Dunbrik-Dunstone you can ride the tide of the biggest building cycle in history. Local plant -- local materials - local labor. Equipment costs moderate. Liberal sponsor co-operation, 100%-150% mark-up on basic costs. Outstanding manufacturing opportunity

> for men of vision and responsubility. Write at once.

W. E. DUNN MFG. CO. 539 W. 14th St., Helland, Mich.

Traffic men care \$4 000 to \$10,000 and up. Thousands of firms and expette on rates tariffs regulations. We train you thereby in operations at home for executive traffic jobs. Personal training under traffic politicities. Placement current and help. Write for few 48-page book.

Traffic Management. the Fast terming Profession.

LASALLE Extension University, 417 Sq. Deerborn St. A Correspondence Institution, Dept. 10817 Chicago B. III.

MASTER COURSE IN

SECRETS REVEALED! Artus methor a techniques of mater hyperdisks have to hyperture sutlable subjects \$4 glance

Complete \$2

phone his in the set of the phone is the first of the plant of the phone is the property of the phone in the first of the phone is the phone in the phone in the phone is the phone in the EXTRA page 11 M tick E MIS port or them to to and Hypostic Catalog No. 2 included

POWER PUBLISHERS, Dept. PS7, 790 Broad St., Newark, M. J.

Do you like to draw? Send name, address, ago and occupation for FREE ART TEST, to find out your ability.

ART INSTRUCTION, Inc. 18141 ART INSTRUCTION BLDG., MINNEAPOLIS 15, MINNESOTA



PIANISTS

Greatly improve technic, sightreading, accuracy, memorizing through ten arkable Mental Muscular Co-ordination Quick results. Practice ef-

fort minimized. I sed by famous planists, teachers, schools, students throughout I S, and in \$2 foreign countries. . . . Also complete classical or modern popular plano courses . . . Harmony, composition, arranging, songwriting studies Unique, practical, easy to apply methods insure success (our 28th year), worthwhile achievement, rapid progress
Adults write today for FREE booklet

BROADWELL STUDIOS Bapt. 900, 2007 Auchorst Ave., Las Augules 64, Calif.

n your whole painter's kit. C O D.'s post, coli.

Every AUTO MECHANIC Wants to Know

A motor vehicle is a machine of many parts, each part designed and constructed for its own special function.

All good mechanics, like good doctors, should know the working theory and operation of each part and understand what causes trouble and how to remedy it.

LET AUDELS AUTO GUIDE SOLVE YOUR PROBLEMS

Every auto mechanic, helper, servicemen and operator can use a copy of AUDELS AUTOMOBILE GUIDE. The Information I gives saves time, money and warry. Highly indorsed by all users. It presents the whole subject of outo mechanics from A to Z in plain language and simple terms.

This Big Practical Book gives full information with working diagrams covering the principles, construction, Ignition, service and repair of modern cars, trucks and buses.

A complete Guide of 1800 pages, with over 1500 Illustrations showing inside views of the working parts, with instructions for service jobs. Blessi engines, Field and Hydra-motic drives fully explained.

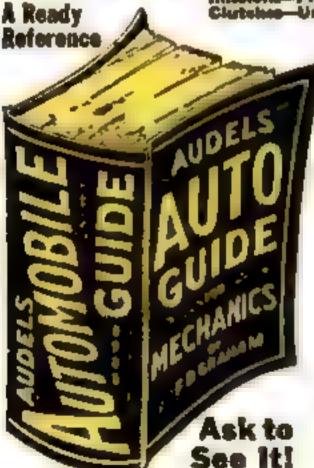
IT PAYS TO KNOW HOW TO

How to fit pistons-How to locate engine knocks-How to fit connecting rod begrings-How to service main bearings-How to recondition valves—How to time valves—How to adjust fan belts—How to adjust carburstors & chokes—How to rebuild a clutch—How to service automatic transmissions—How to service brakes—How to adjust steering gear-How to cope with ignition troubles-How to servas distributors-How to time ignition-How to "tune up" on engine.

INFORMATION IN A HANDY FORM

73 INTERESTING CHAPTERS—Read this partial list of subjects on which proctical information is fully given for quick reference under the headings as shown below. Ready Reference Index.

All Parts of an Automobile—Automotive Physics—The Gas Engine-One Engine Principles—Multi-Cylinder Engines—Herse Pewer—Automobile Engines—Stationary Parts—Moving Parts—Pictors—Pictors
Rings—Connecting Reds—Crank Shafts—Valves—Valve Gear—Canta
and Cam Action—Valve Timing—Cooling Systems—Fuel Feed Systems—Dual Fuel Feed—Mixture—Carbureters—Carbureter Service—
Automatic Cheks—Super-Chargers—Transmissions—Special Transmilesions—Fluid and Hydra-matic Drives—
Clasteles—Fluid and Hydra-matic Drives—
Clasteles—Fluid and Reservice Shafts



Clutches-Universals and Propoller Shafts -The Differential-Rear Axiss-Rear and Front Sucpension-Running Gear-Brakes-Wheel Alignment-Knee Action—Steering Gear -Tires-Lubricants and Lubrication—Automotive Electricity—ignition Systems— Magneto Ignition—Spark Plugs-Ignition Colis-Distributors-Automatic Sports Control-Ignition Timing-Generators-Starters-Generator and Starter Testing-Lighting Systems—Storage Testing-Dissel Engines and Trouble Shooting.

FOR YOURSELF SIMPLY FILL IN AND MAIL COUPON TODAY.

COMPLETE

AUDEL, Publishers, 49 W. 23 St., New York 10, N.Y.



Sent on 7 Days Approval

Free up your own skill with the facts and figures of your trade. Audem blechanies (huldes contain Practical Inside Trade Information in a hamly form, Fully illustrated and Easy to Underwand.

Highly Endowed. Check the book you want for Tidals FREE EXAMINATION Bend No Money. Nothing to pay postmen,

ANDEL, Publishers, 40 W. 23 Be., NEW YORK To account the property examination become another than 10 months again to make \$1 m. Days on each book or set ordered and butter must \$1 mainthly on each book or but wall have past price, etherwise I will return tham.

TRUCK & TRACTOR GUIDE, 1299 Pages
AUTOMOBILE MECHANICS GUIDE, 1800 Pages
MACHINISTS HANDY BOOK, 1650 Pages
MACHINISTS HANDY BOOK, 1650 Pages
BLUE PRINT READING, 416 Pages
MATHEMATICS & CALCULATIONS, 700 Pages MATHEMATICS & CALCULATIONS, 700 Pages, SHEET METAL PATTERN LAVOUTS, 1100 Pages SHEET METAL WORKERS HANDY BOOK, 388Fgs.

MECHANICAL DRAWING GUIDE, 160 Pages

MECHANICAL DRAWING & DESIGN, 480 Pages RADIOMANS GUIDE, 914 Pages

ELECTRONIC DEVICES, 218 Pages

ELECTR C MOTOR GUIDE, 1900 Pages

ELECTRIC WIRING DIAGRAMS, 272 Pages ELECTRICIANS EXAMINATIONS, 250 Pages, . ELECTRIC POWER CALCULATIONS, 425 Pages. HANDY BOOK OF ELECTRICITY, 1440 Pages. ELECTRIC DICTIONARY 9000 Terms ELECTRIC L'BRARY, 7000 Pages 12 Book Set) 1 MARINE ENGINEERS HANDY BOOK, 1256 Pgs. SHIPPITIES HAMMY TOME, THE Pages ATTRIBUTED IN A PROPERTY OF THE PAGE TO PER POWER PLANT ENGINEERS GUIDE, 1500 Pages GINEERS & FIREMANS EXAMS PUMPS, Hydrautics & Air Compressora, 1658 Pgs. ENGINEERS LIBRARY (3 Book Set) MECHANICAL DICTIONARY, 950 Pages,
GARDENERS & GROWERS GLIDES (4 Book Set)
CARPENTERS & BUILDERS GUIDES (4 Book Set)
PLUMBERS & Steamfitters Guides (4 Book Set)
MASONS AND BUILDERS GUIDES (4 Book Set) PAINTERS & DECORATORS MANUAL, 450 Pm. HOUSE HEATING GUIDE, 1000 Pages

	*1		l I		p.			 ,			<i>e</i> 1	,		,	,	p.					,
Address	+ +	4		ŀ		÷ 1	 	÷				 +	+			4		۰	-	4	
Octupation	١.	+ 4								_		_	- 1			.,					



cratters

International Radio long-range

Enjoy the thinks of hearing news direct from all over the world! You can even penetrate the fron t actain. And later in on the fascinating conversations of Ham 'rodio hobby:ata. In add-tion to standard broadcasts, you can. . .

- HEAR POLICE COMMUNICATIONS!
- TUNE IN ON AIRPLANE COMMUNICATIONS!
- HALLICRAFTERS is the radio for YOU, ideal for remotely located homes, farms, camps, suburbs or cities where good reception in ordinarity difficult

THE POWERFUL 1-368 has continuous coverage of three bands, from 540 kc to 32 Mc. In handsome steel cabinet designed by Raymond Loews - and precision-AC BC PARCE engineered throughout as only Halbernfters \$4950 con build a radio.

HALLICRAFTERS-WORLD'S LEADING MANUFAC-TURER OF <u>PRECISION</u> RADIO AND TELEVISION

Hallicrafters-Dept. PS, Chicage 24, Illinois Due to the national emergency only a limited number of II. these sets are being made. Reserve your 5- 3B now mail could a for name of distributor who can serve you directly ĸ П THIS RESERVATION WILL BE HELD FOR 30 DAYS П AT YOUR DISTRIBUTOR Should you not buy within Ħ that period of time, the set will be given to the next name on П the list. We will also send you free bruchure giving full 18 II. specifications. ī ш TOUR NAME. ķ 鵢 a Е ш 8 STATE 951 Ŧ



1755 1/2 Glendale Blvd Los Angeles 26, Calif.

1660 Hour

beautifully

mritian, pina

special pan-

point for

chaded

reme

writing.

CARVE EATHER

Easy to Cours in Space Time. Foscinating, Profitable HORBY.

Have fun and make money too! Carve handsome bags, blilfolds. bells, moccasins, key cases, etc. from our huge and varied stock of Leather Projects that come READY TO CARVE AND ASSEMBLE To select what you need, write for complete, fully-lillustrated catalog Contains over 200 photographs of projects leathers tools and acces-

suries. Learn this fascinating hobby-start small and expersment. Write for catalog inday include 25c to cover printing and mading

WELL HOW TOU COMPLIES MATHER CHAFF CATALOG

A "GOOD HAND" HELPS YOU SUCCEED!

ndurthing quisitly improves with our may-lq-send stand picture lescons! Put your spare time to good use, send teday for FREE BOOK "How to Second e Good Permist or shock relumns mented below Susiness Weiting | Artistic Writing at \$1 each Card Welling | Bird & Donign Flourishing Engraphing Alphabets, COMPLETE BET 64.60

AMBLYN SCHOOL of PENMANSHIP 430 Stage Midg., Houses City, Ma., USA

Many Finish in 2 Years

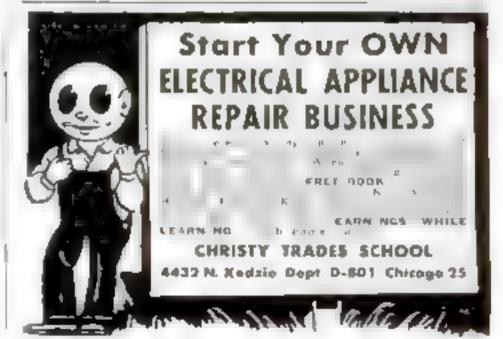
Go as supply as your time and abilities permit Course equivalent to resident school work — prepares for codego entrance evanue. Standard H. B. tests supplied. Diploma Credit for R. S. subjects a ready completed. Single subjects R desired. Black school education to very important for advancement in business and foductry and seeks by Jon. be handlespeed at year life. Be a high School graduate. Start your training new. Free Balletin on request. No obligation.

American School, Dept. 14-749 Draxel at 58th, Chicago 37

ch Repairing Learn at home loney

Wat her k win great demand Train stepby step under experts. We furnish all tools and 15 jewel watch and practice move-ment Turn spare time into cash 10 casy lessons Al rused school Low cost Send for FRFE book today.

INDIS SCHOOL OF WATCH REPAIRING 2870 Cicton Ave., Dopt. Philo Chicago 16, IN.



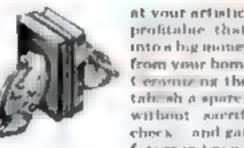
Let me show you how to make all these beautiful objects of art, giftwares, and costume jewelry at home in spare time



Make as much as \$5.00 for One Hour's Work

You, I will send this to you free. It to la all about one of the most astoxishing discoveries of recent years, Shows how the worth of material can be turned into a \$5.00 profit Shows how to make somethour from nothing " A handful of twogs or transformed into a gargeour corn like becklere a clain-

ning dresser box is made from a penny's worth of rice and a few navy beans metal like laper pip from a live leaf. You need no knowledge of design no artistic teaming. The countless forms of nature provide your designs. The simple art of A eraanizing 'entitle learned in a few minutes. fuscinating hobby that makes friends marvel - materials necessary at low cost.

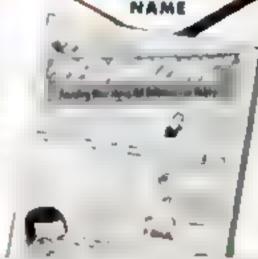


at your actualic ability yet it was profitable that it can be turned into a big money hunness, operated from your home. Many men bud to Cenamic not the opportunity to retain ship spare time home business without sucreticing job or paycheck and gain confidence for the fature in knowing that at any time

they can expand into full time work taking profits from three different branches of the business Women Loo, find in Ceramorng a satisfying expression of their creative gifte both as a holiby and as a means of making extra money. One of the big advantages as that no expensive equipment, reading by even a chief It s an activity in machines, or tools are required. And I show which the entire family can take part. It was you how and where to go to get the few

page book in full color shows you

- Loarn all the secrets of Coramiting
- Turn twign, leaves, flawers, into gorgoous contume jewelry
- Transform Inexpensive articles into valuable objects of art
- Get the thrill of artistic. creation without learning to draw or design
- Start a spare time hobby that can bring extra money every week
- Establish a home business that can be expended into full time operation any time money is needed.



MO SALESMAN WILL CALL-ALL MAILED FREE!



You can even preserve and base-tify baby shows to look like after, gold, broader or glistening kile fred chits by this amazing pro-tes. They bring people of \$10 fd for every dollar of material cost

Send your name to me today. A penny postcard will do, or mail the coupon. I will send you a beautiful eight page book filled with nictures in natural colors showing scores of the things you can make and explain the entire process and the steps necessary to get started No salesman will call to bother you - and the information is all free and postage prepaid. Whether you want to start now or at some future time get the information at once. You'll be glad you wrote. Address me,

R. E. BRANDELL, WARNER ELECTRIC CO. 1512 Juryin Ave., Dopt. 210 Chicago 26, Illinois

Raymond E. Svendall, Warner Electric Co. 1512 Juryls Ave., Dept. 210, Chicago 26, Ill.

Dear Mr Brandell With the understanding that there is no charge, no obligation, and that no salesman will call, you may mail postpaid a copy of your big eight page book in full color showing scores of pictures of things I can make, either as a hobby or as a spare time money making home business.

Reme	•	 	*****	4	,	***************************************
Address						

Sinte.

HOME OWNERS! BEGINNER! TRADE EXPERT!

LEARN and SAVE, REPAIR or BUILD with these practical books.

Concrete Black Construction for Home and Feren by Datzeil & Tawnsend. No need for any previous building experience to build that gatage, summer home or milk house with concrete blacks. This practical guide shows every step from how to plan to howta-build with one of the most plentiful and 🔈 economical building materials known to man Over a hundred pictures and culoway diagrams show exactly what to do and what not to do. Tells how to place corner brack how to make foundations easy, how to paint for special purposes. A picture story of everything in building any type of structure with concrete blocks, easily and cheaply 214 pages. Profusely illustrated Use h nely free trial to ann below \$2.75



Curpentry by G. bert A. fownsend A clear explanation of madern carpentry construction including framing, roof constructions, general corpentry work, exterior and interior finish of buildings, building forms and working drowings, and form buildings. Covers everything you need to know about fumber, tools joints and spices, floors, stairs, partitions, rafters, etc. Gives short cuts and tricks used by the moster corpenter Easy to-understand, 304 pages, 580 dlus \$2.50 Use no risk ton below

FOR BY

REPAIR TONR OWN PLU

How to Design and Install Plumbing 6. A. J. Matthias, Jr. A guide that fits the needs of the beginner yet so complete that even the master plumber can pick up some new tricks of the trade Contains hundreds of illustrations, full size b vepr ats specificutions and instructive details for septic tanks, starm drainage, soil pipe water tuppiy, fixtures traps, drains pumps, etc. An outstanding feature is complete design. and installation of plumbing in a modern sex room, two both residence. 349 illus trations, 442 pages, \$3.50. Use free-tripf coupan below



EASY TO REMODEL!



How to Remedel a House by Dolgett and Townsend. With this proctical, easy-tounderstand book, crammed with clear explanations and illustrative examples, you can remadel any house and save thousands of dollars. Learn to plan the remodeling of rooms by a method that a like playing with blocked Tells how to road architectural plans, shows structural details, covers storrs, insulation, bathrooms, kitchens, healing and air conditioning, etc Sixteen full size blueprints. 505 pages, 350 ilfustrations, \$5.00. Moil no-risk coupen below!

MAIL THIS NO-RISK COUPONI DON'T DELAYS

American Technical Seclety C770 848 E. 58th Struct, Chicago 37, Illinois Please rush me the following How-to-Do-It-Books I om thacking below. If I'm not convinced that these beeks will help me save many thousands of dollars by building and planning myself, I may return the books within

10 days and receive full and immediate refund.
CONCRETE BLOCK CONSTRUCTION FOR HOME
AND FARM \$2.75
HOW TO DESIGN AND INSTALL PLUMBING 3.30
Print Nome.
Address
City & ZoneState

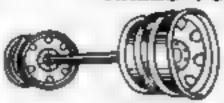
TRUCKS

At A Savinos. New FREE Catalog For Jeep, Dodge, Chevrolet, G.M.C., Studebaker

Brand New-Mot War Surplus-Complete JEEP TOPS and SIDE CURTAINS

Filts of Military Jeeps. Also adoptable to some Civilian \$59.50

AXLES FOR TRAILERS



(Supplier) Henry Duty axles suit able for building of many taken of trailers, form wagons etc Standand width attraight axle h neh s ours and to complete with Huba Timken bearings of flole 750220 or a 1620 wheels with \$69.50 out brakes mo, ...

Dual Wheels . . . add \$15.00 extra

Hundreds of Other Truck & Jeep Parts and Supplies All prices quoted good 30 days FOB, Kansas City 25 G. deposit recutred on \$ 00 agders



1901 TROOST-GR1800-KANSAS CITY, MO.

ACCOUNTING

This nationally repowned school has demand for graduates in good salary positions thru Nationwide recognition and placement service Department PSG today for Hig 32 name Success stock to be sent to you 35 r to



BUSINESS UNIVERSITY



proven in EFF pay as Ter or more

dealers to seeke No estimat in

Notional School of Meat Cutting, Inc., Dev. O. 107, Toledo 4, Ohio.



FOR THIS

Make money Konw how to break and train horses. Write today for this book FRFS together with special offer of are interested in Galting and Riding the saddle

horse, check here () Do il teday-neu

BEERY SCHOOL OF HORSEMANSHIP Dogt. 8810 Pleasant Milt, Oblg



MANY GANE NECDIE USCAS ACPORT UP

TOW TEST A SAME MEEDLE IN YOUR CAR for less days then compare your mile are and performance if satisfied send as there are performance if satisfied send as there, brakes for satisfied out return it far ebruzh and sand send as there differ on its fort and products (Since suphorities differ on its fort la and send as the satisfied of improvement the products (Sont shocked as a street of improvement the products (Sont shocked in the adustront acres to carburetors and instance and send who introduced make and extensive the first state of the minutes.

WRITE TODAT, ENCLOSE NO MOMET PAY POSTMAN NOTHING. Just send us your name address and make and year of car mational, automotive actail comp., Dept. N-10

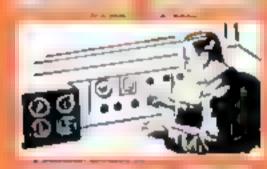
350 W. Washington Bird.

Venice, California

FREE







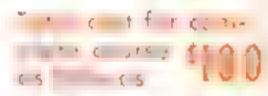


Famous CRESCENT SCHOOL of Radio & Television now offers a complete HOME STUDY COURSE for those unable to attend classes! CRESCENT SCHOOL's experience of millions of training hours assures you of the finest training available. New simplified lessons and illustrations — no previous training needed!

Get into this high-paying field with a future! Many students start to earn extra cash while learning. Complete the course as quickly as you can learn. Certificate awarded upon completion of course. CRESCENT SCHOOL's free placement service is available to you!

45 / LT.0 /3

Crescent School — one of the largest of its kindl Multi-million-dollar plant in its own 6-story building.





FREE!

Send TODAY for FREE sample lesson & complete details about the Croscont School HOME STUDY COURSE!

SEND COUPON TODAY!

Dept. A-10

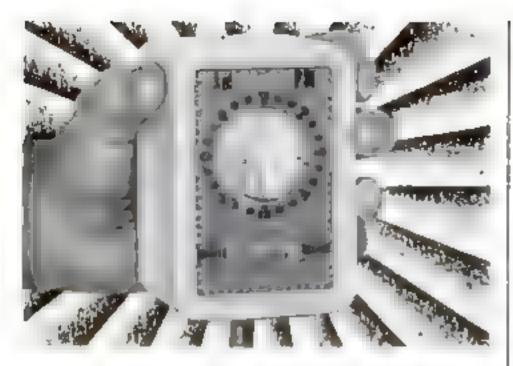
500 Pacific St., B'klyn 17, N. Y.

Sirs: Rush free sample lesson & complete details about your HOME STUDY COURSE ... at no obligation to me.

NAME

AUGRESS

ITY ZONE STATE

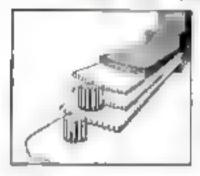


AMAZING INVENTION **EXCITES MILLIONS**

OWNERS of electric refrigerators are excited about an amazing invention that automatically defrosts these "les boxes" every night, without mess, work, or attention. The tremendous demand for this Patented invention, the D-Frost-O-Matic, is creating big-money-making opportunities for men and women. They use a FREE TRIAL plan that pasures sales in three out of five homes,

They earn up to \$210.00 a week just spending a few hours a day plugging in units on a Free Treat basis.

FIRST VERNIER GEAR USED TIME CONTROL



Never before has a Vernier gear been used in an automatic control of this type. The unit is greatly simplified, and gives trouble-free service for years. Designed by Karl Brocken, member of the Society of Industrial Designers.

Independent Laboratory Test Makes Selling Easy .

Tests by the famous U. S. Testing Company, Inc. proved the D-Front-O-Matic saves 20% of electricity, saves excess west on refrigerators, and keeps food fresh and appetizing for longer. The Free Trial plan is making up to \$21 00 an evening for men and women who sell in spare time, with far larger turns for full Jime.



If you would like to norm a great deal of measy stall the cus below right now, for the D-Frant-O-Metic FREE TRIAL pla

SER	ID	C	Ot	JPO	N NO	W
Mr. Sidi D-FROS S M. Mic	T-0-M	ATIC	COR	P. . P\$-t0, c	Chicago 2, III.	
TRIAL	HUSH Itani,	yeur	the L	HANTEED	PROFIT and	FREE
Name					********	
Address						
Town Test No.	E -2059				. State	



RADIO ENGINEERING Television, FM, Broadcasting.

Servicing, Electronics, Aviation,

Marine & Police Radio taught thoroughly. 72 weeks' Engineering course equivalent to 5 years' college radio work. Approved Veteran Training. Catalog upon request.

VALPARAISO TECHNICAL INSTITUTE Bopt. 803 Valparaiso, tad.

WRITE TODAY FOR NEW FREE CATALOG

Learn to cast thousands of perfect figurines, plaques, book ends, ash traye, etc. Stert TODAY!

PLASTIC ARTS STUDIO

PROFITS MAKE YOUR OWN RUBBER MOLDS

NO EXPERIENCE MILET PRODUTE

Little capital needed. Full in-structions X L. Rubber Pints \$2 50, Quarts 54 00, Special: 3 models and enough rubber for 5 models prepaid for \$3.50.

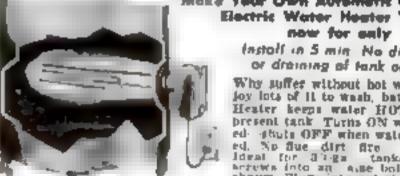


BARN BIG MONEY! PERSONAL ATzine Fashion - Portrait - Advertising Natural Color Photography Eplendid equipment, glamorous models. Or - our COMPLETE HOME STUDY COURSE provides you with a spare time short-rut is surrass.

Our 4.nd year Write immed stell for BIG FREE BOOK

YORK INSTITUTE OF PHOTOGRAPHY 10 West 33 St. New York 1

How to Always Have HOT WA Make Your Own Automatic



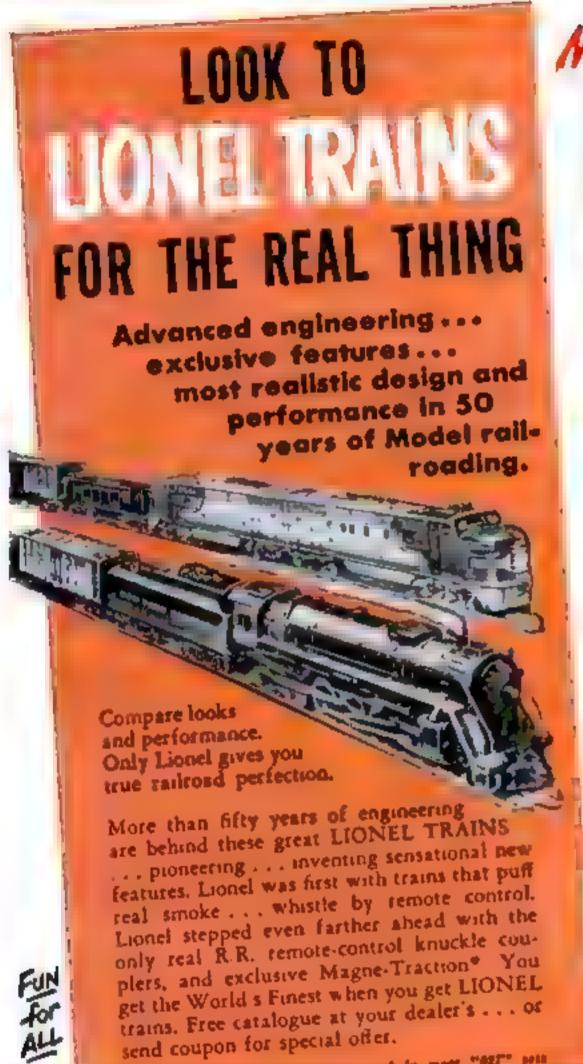
Install in 5 min. No disturbing or draining of tank or pipes Why suffer without hot water? En-

now for enly

loy lots of II to wash, bathe share Heater keeps water HOT in your present tank Turns ON when need ed shuts OFF when water is heat-

ed state OFF when water is heatered. No five dirt five ideal for 3 2 2 tanks Rester arrews into an alse boller tan as shown Plots into outset 1730 will be a 110 v. AC Riso 2700 w. 230 w. 110 v. AC Riso 2700 w. 120 w.

COLLOID EQUIPMENT CO., INC. Dept. PS10 50 Church Street.



MAGNE-TRACTION

Lionel locos with Magne-Traction climb grades where others can't even start. Add mountains and curves to layouts never before possible. This Lionel development increases train speed, pull, climb, and control. A permanent Magnetic grip through truck and wheels does it. A Lionel exclusive.



Lionel loco speeds up steep grade with magnetic track-holding power more efficient than deadweight.

Real R.R. Knuckle Type Couplers



Remote control button uncouples cars instantly. Cars couple automatically when brought together. Only Lionel has this remore control, electro-magnetic coupler. It's designed after A.R.A. Knuckle Couplers that are standard on American ratiroads.



Smoke

Clean, white smoke puffs with account of drivers.

Two roned built into render - real R R pitch - remote-

Special Coupon Offer





Die Cast Trucks Solid Steel Wheels

SEE all the LIONEL TRAINS and accessories in the new catalog

"gratiable to all "g" gauge sets and in most "GET" sets

LIONEL TRAINS, P. O. Box 362.

Madison Square Station, New York, N. Y.

Places send me special Llosel Train cotolog effer, postage prepaid. | enclose 25¢ to caver pertage and packing.

- The new 36-page full-color blood cutating
 The new 5½" decide-faced record" of whisties, boils, railroad second effects and Diesel borns.
- 10 felt-color ministers billboards.

Ciby.

ALL FOR ONLY 25¢

Color

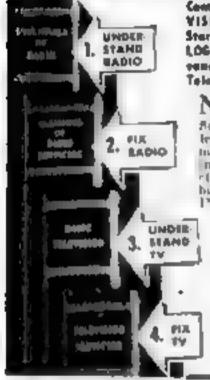
Billboards

Hear ... Bells ... Horns Whistles on this Rail-Road sound effect record

Plays on all 78 RPM phonographs except some spindle or automatic changers.

NOW! Write Your Own Ticket In This ESSENTIAL Industry!

4 Easy Steps to Big Money in Television-Radio



Complete Self-Training Course in TELE-VISION and RADIO Propored by Experts-Starts From Scrutch, Tubus You BY SIMPLE LOGICAL STEPS From Busic Theory to Adcanced Prablems of Repair, Installation, Televising, Caser TV, etc.

NOW you can do ANY TV Redic installation, service or repair tob operate field testing courpment, unperstand problems of TV besidensting FM VM trans Incarono ele Bien inte a posa partog jak in the lamin tiple economic flere. Cret a spricinital a reduced of start tour our service. banchess Tran yourself AT HISME

YOUR SPARK TIME with the Meteras Hill Basic Course in TV nad Ralle

2276 Pages-1611 Illustrations

Complete 4 votume course by out standing table and TV nettuctors hiers detail elearly expanded. Over TWO THUI SAND PAGES of step his attention anstruction ther SINTLEN HUNDRED Bow to lo H. Photra think or me section diagrams etc. Trouble should by harts show

how to desghove any radio or Th breakdown how to repair it or Decl 3

Love for their many times pier can qualify a fegabner for shows experienced technician new Litera

SEND NO MONEY

Over 8 m I too TV sets. me son tactor o use Phortuge of ak Hed workers of it ticul Men who know earthquire can write the town ticket in Govern ment Oli private interprise They are ENSENTIAL! Course can put you in line for success in America a fastest growing th dustry

Mad coupon to examine com ste four vacuume con se Fill I p 14 days Se chigas on h temine note dual bords FREE PARTITION. for 10 days to check of proper tunes in coupon Mail coupon at once

PARTIAL CONTENTS

ESSENTIALS OF RADIO. 800 pages, 433 Hes, Circuit Analysts . Vacuum Tuber • Create • Amp ther • Tube Oscislator [*DW## Rupply, etc.

ELEMENTS OF RADIO BERVICING, 475 pages, 375 Higs. Mocakers & Astenbas Auto Iladine etc.

BASIC TV 892 pages, 415 High Symphocrating Wildre Beginnt . Hr gr mean f onigot FM A tyrament • 19 byre. Tuber etc.

TV SERVICING, 429 pages, 348 slage American * 1,0 rolegong Recept on Troubles + Interfereme Herreigen AND MUCH MORE

FREE 10-DAY TRIAL COUPON

McGRAW-HILL BOOK CO., Inc., Papt. PS-10-51 327 West 41st St., New York 18, N. Y.

Please send me for 10 days FREE FRAMINATION McCrowMil's Basic Elements of Radio Elevicing, Basic VeleVision, Televicion Servicing Total retail price of the fourbooks a \$20.75 Special Course Prices Unly \$19.95 in easy
installable up 37 is a satisfied with course 1 will return be
four Course books pay he bing Otherwise I will send you
table \$1.05 plus pristings then and the books individually
imaja imenia of only 300 rach
If you wish to enaming any of these books individually
check below the ones you wish no to send you for 10 Days
FREE EXAMINATION:

PREE EXAMINATION

Extentists of Radio, \$6.50 Elements of Radio Servicing, \$4.75 Basic Television, \$6.50 Television Servicing, \$6.00

For whichever of those books f decide in keep I will send you 62 % pus postage, at the end of 18 days, balance in seek monthly install meets

n.		_	_
179	-	н	Œ

CHY ...

18-10-51

Company

Position

WE'LL PAY POSTAGE if you enriose first payment of

#1 95 when ordering the course of the full price of book
when ordering individual books (see prices observe) flame

[vi..Day Televin Pr. Trege for Full refund

MONTH AFTER-MONTH, YEAR AFTER YEAR, YOU SEE OUR AO. REMEMBER IT'S DRWDEROUS to pay long if you want the

GOODRICH, UNITED STATES, GENERAL, & OTHERS, NOT RECAPS

Our policy is to select your tires so carefully, as if our very future depended on the service given by that particular tire, FREE TUBE WITH "ALL" BLATT'S GOOD GRADE TIRES

GRADE, 16 MONTHS GOLDEN RULE QUARANTEE BOND 8 \$4.14 700:15 \$4 \$4 \$4 \$50-20 \$7 \$4 \$328 \$6 \$5 \$4 \$6 \$6 \$7 \$4 \$328 \$6 \$6 \$6 \$6 \$6 \$70-15 \$6.74 \$700 20 \$8 \$4 \$1216(10) \$6 \$4 \$6 \$6.06 \$710-15 \$6.84 \$750-20 \$8 \$6 \$000-20 \$3,84 \$6 \$6,06 \$710-15 \$6,64 \$23.20 \$15.92 \$1000 \$0 \$3,84 450-14 \$50-LE

FINEST GRADE 28 MONTHS ODLDEN RULE GLARANTEE BOND THIS GRADE MADE THE BLATT NAME WORLD PAMOUS."

450-20 \$6.00 450-21 \$6.00 700 15:6 \$10 750 18:6) \$18 600-20 \$8.94 \$00-20\$18.54 \$10 750 18:6) \$18 600-20 \$8.94 \$000-20\$18.54 \$10 750 18:6) \$18 700 16 8.49 \$50-15 \$2- 650-20 \$9.94 \$1000-20\$18.54 \$100-20 \$18.54 \$1000-20\$18.54

100-14 Military 400-14 750-20 \$6,75 Reg. 16 mes. Reg. \$18.94 Rep. \$10.44 19.94 Super 9.75 Super 30 mes. Super

BLATT BLOG GIRARD & LANCASTER AVES, DEPT, P.E., PHILADELPHIA 31, PA. Send thick of money order and this ad for rush of princip We won't ship a tire we wish in ture. The name to trust to rubber PHICES SCHOOL TO CHANGE Shipments Bushed Dawn South Up North and For West

TAKE MIGH SCHOOL AT HOME

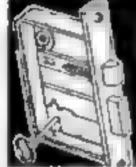
DON'T FIGHT YOUR FUTURE

Take life easier—make business and social success more certain—as a high school graduate! Earn your d ploma at home in spare time-in 18 to 24 months. C T.I. Guided Study equals resident work. Books supplied. Credit for school elsewhere. College prep. Terms. Write for detar la'

COMMERCIAL INSTITUTE TRADES 1400 Greenloof Ave. Dept. H1-10 Chicago 26, III.

to impro conducted of effective hab give you added advan ; tages and bester a prigram so Post britab hambeaus you! more than you will ever

Post Strick hardrops you move than you if ever then you is lever then you is a server to end to the then the formal the fact that have the formal that the fact that



1

9 -

AV IT'S DIV STORE Alegady is its min the part of the same of the 10.75 SCHOOL FREE HER KLET, LOCKSM THING INSTITUTE Dept P\$ 22 18 Parts Ave



MODEL BUILDERS!

NEW 1951 CATALOG

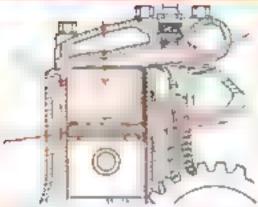
PLUGS . MARINE ENGINES . FUELS MODEL RACERS . ACCESSORIES

OHISSON & BICE, INC. 3340 Entry St., Lee Angeles 23, Cultivries	T AND MAIL TODAY
Massa RUSHcopies of th	ie NEW 1951 DAR Catalog at 15c oach
for which I am enclosing	_in stemps or doing to corer handling
and malling.	
Hame.	
Address	
City	ZoneState

ENGINE GETS BALKY...

MAKE THIS ROAD TEST

MARKE



SAFER! Marvel Mystery Oil is the result of more than 30 years of lubrication research and improvement — specially developed for today's high-compression engines. Unlike many other oil additives, it contains no harmful acids or graphites - instead, it protects and adds to the life of your motor!



Desiration of the Party of the

Married Street, or other particular and particular street, and parti

SMOOTHER! Marvel goes to work where regular oils stop. It combats topcylinder dry-firing . . . reduces wear . . . keeps your engine free of gum, sludge and varnish. That means a dream of a ride, even under the most extreme conditions of pressure and heat.

Designation of the second section of the last section of the last

THE RESERVE AND ADDRESS OF THE RESERVE AND ADDRE

GET THE WORLD'S LEADING

RADIO & TV CATALOG

REE

1952

212-Page Edition



ALLIED'S

BIG COMPLETE BUYING GUIDE

Save on Everything In Radio and TV

SP-TO-BATE

SEND FOR IT NOW

Everything for Experimenters, Builders, Amatours, Servicemen, Engineers and Soundmen

Send for ALLIED'S 212-page 1952 Catalog, the valuepacked guide to everything in Radio and Television! Latest home radios, TV equipment, Amateur supplies, P.A. Systems, Hi-Fidelity Sound, recorders, test instruments, builders' kits-plus the world's largest stocks of electronic parts, tubes, tools, books and diagrams. Get more for your money—send today for your FREE 1952 ALLIED Catalog!

. Get Radio's Leading **Buying Guide Today**



ALLIED RADIO

ALLIED RADIO CORP., Dept. 7-KK-1 \$33 W. Jackson Blvd., Chicago 7, III.

Rush FREE 1962 ALLIED 212-Page Catalog.

,	Name			
	Address			
	City	Zone	Santa	

MEN! send for this MONEY-

Do you want to make more money in full or spare time as much as \$15 00 in a day? Then write for this BIG OUT-FIT, at you FREE, containing more than 150 one quality tabrics, sensational values in made-to-measure suits and overcoats. Take orders from friends, heighbors, fellow-workers. No experience needed. You'll say it's the greatest, make money you ever taw.

SAMPLE SUITS TO WEAR

Pay No Moneyi Send No Moneyi Our plan makes it easy for you to get your own personal suits and overcosts without paying it, in addition to your big each earnings. This offer is limited. Rush your name and address for hig FREE OUTFIT—today!

J. C. FIELD & SON, Dept. Y-1720 Marrison & Throop Streets, Chicago 7, Illinois

RPENT

y set p hair

MIDWEST SCHOOL OF BUILDING TRADES, Dopt PS 10 Conter 51

- the Madia Terestroph Lode Teacher that takes the prace of an operator halfuctor and each en anyone to master rode w thout further has at after A a late a spea from beginners sliphs in to typical messages on all subjects. Speak sange 5 to 40 WPM Always ready no QRM Thousands have acquired the code with the last output alpha Mystem. Write loday for conventent contal and purchase plans

INSTRUCTOGRAPH COMPANY 4791-P Sheridan Read, Chicago 49, Illinois





GRIFFIN LEATHERCRAFT KITS

Best assortment of tools, materials in U.S. A. I Send 25t for 116-page catalog (money refunded light order)

GRIFFIM CRAFT SUPPLIES UINCE 1924.

5626 B Telegraph Ave., Oakland 7 Calli

Tells How You Can Learn Men. Boyt. dun ers a ne tropines dermist V D Dieds. i spark

en fun, tes genits FREE Process o strange. Book - mealla 1

The same of the sa M. W. SCHOOL OF TAXIDERMY, 2518 Elwood Bidg., Omaka 2, Heb.



CONSUMER DEMAND RUNNING WILD ON SPECTACULAR ONE SECOND DEMONSTRATION—A "GOLDMINE" FOR SALESMEN AND DISTRIBUTORS

So new only a handful of salesmen have it-yet such crazy things are happening it is unbelievable. Grahem, a spare-time salesman. ordered six. He unpacked them at work and the other employees were so thrilled by HANDILITE that all six were sold in his own office. In 10 minutes he made \$14.70 and had to order 12 more. Dunlop walked into a large office building with the red flasher "on," Within a half hour, he had sold 5 to building amployees before even hitting the offices. He sold twelve—all he had-within the hour! But it is no wonder people buy HANDILITE as soon as they see how it works -What it does!

Now at last roadside accidenta can be averted when car owners are forced to park their cars at night for tire changes or emergency repairs. For the first time, a vivid F-L-A-S-H-I-N-G RED signal light has been incorporated in a portable, battery-powered electric lantern. The amazing one-second "Wordless Demonstration" makes sales as fast as you turn the switch. Irresistible appeal is already sweeping thousands of Salesmen and Distributors to new money-making successes.

THOUSANDS WANT IT

wont HANDILITE, TRUCK and FLEET OWNERS, VACATIONISTS, SPORTS-MEN, HOMEOWNERS and FARMERS want it as perfect amergancy light. A perfect warning light—also unequalled as a general purpose lantern—as boat light, for hunting, camping. A thousand uses—in garage, basement, attic—for night-time trips to farm buildings, as tractor or farm wagon light—for summer homes and summer resorts.

LONG REEDED INVENTION

Make no mistake. HANDILITE is no novelty invention by a hopeful unknown. It is produced by the same manufacturer whose products are already standard with the mighty railroads of the country.

Selling HANDILITE is not like selling anything you have ever sold before. Here is a dazzling, convincing new product that literally sells itself. Walk in anywhere. Flip the switch—immediately your prospect sees the vivid red signal light flash its warning—visible a mile away. A second turn—on comes the white light casting a brilliant beam for 1,000 feet, while the red light continues to blink. A third turn—and

the red light goes off, leaving only the white lantern beam. A fourth turn—all lights are off. WITHOUT SAYING A WORD, YOU HAVE THE MOST COMPELLING SALES TALK you've ever given!

ONLY

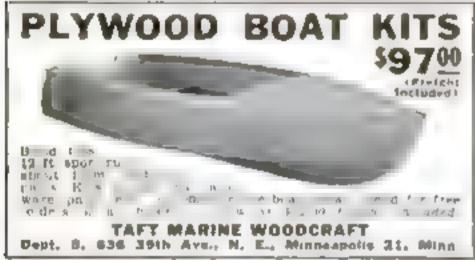
MAKE AMAZING EARNINGS SELLING DIRECT & TO STORES

Write at once for complete facts. Learn how you can sell direct at Big Profits—Then, after cleaning up in a territory, sell stores big quantities for resale under a proven plan that moves HANDILITE fast. The first man to open up is going to clean up. So get the facts, quick. Already territories are going fast. Write, wire, or airmail the coupon—but do it this minute. Every minute is precious.

HANDILITE CO. Dopt. 18-5 Sturgeon Boy, Wis.

Sturges I want	ndilite Co., Dept. 18-5 a Sey, Wissensia to get in on HANDILITE, cts and sample offer at once.
Name	
Man	
City	State









Shioy A um f am

With an ALMQUIST 1

· déclies

. Fair traces

ted to a see that the shift in support Fuster Pickup near in self gent derving more kar № Extre Power economs. Passerner of the tre curs. Full DEALERS WANTED 1st VI V Mar Hold for all care \$12.55.

"Soup Up Your Car"

Pameur book shows how to Jouble power & gas titleage Tutistig Rar ing & Speed Secre & Economy Row to Hated

Past Stock Cars Harers & fot Bods Equipment Catalog showing hundreds of Itams Bost postpaid for only , .. 250

MQUIST ENGINEERING & MFG Milford 43Z Po. DEALERS WANTED

TRAIN in Our SHOPS - .

in AIR CONDITIONING, REPRIGERATION, ELECTRICITY, MAJOR APPLIANCES, AUTOMOTIVE MECHANICS, BODY and FENDER REBUILDING

If interested write or wire

COMMERCIAL TRADES INSTITUTE Inc. of Ala. 200 S. 20th ST. 284 IVY BY. M.E. BIRMINGHAM, ALA. ATLANTA, GA.

. VETERANE ASK ABOUT G I TRAINING

nithing & Keymak

HOME TRAINING OLYFIT INCLUDES NEY MACHINE, SUPPLIES AND TOOLS NECESSARY TO GET STARTED IN YOUR OWN

Exertent fund of part I as to the a population of Professional out to the address applies to the kind of the address of the ad

Make hour dwg I ramps give \$4.95 and age decise? I a be attend a Switch or grant of the part of the pa neder

MPEIN TEMETERS 844 Sa Breadway, P8 1051, Los Angeles 14, Calif.

USTFUL - EDUCATIONAL - INEILLING

FISTULA

FREE BOOK—Explains Dangers of Associated Ailments



Piles, Fissures and R stal Asserss are common allments that may also be associated with higierfed Fistula Gur now 164 page all studied took sent FREE Write today McCleary Cimic & Hospital 1071 Elms Blvd., Exc |sior Springs, Mo.



I DIDN'T KNOW A SINGLE NOTE WHEN I STARTED!

WHAT I LIKE IS THE LOW COST --JUST A FEW CENTS A LESSON!

AND IT'S SO MUCH **FUN--YOU START** RIGHT OUT PLAYING REAL PIECES!





No Matter WHO You Are, or WHERE You Live, or How LITTLE You Know About Music, You Can Soon Play Your Favorite Pieces by Note. FREE BOOK Tells All About it.

No wonder over 850 000 people have chosen this movern way to learn music! Here at last is a method by which anyone can learn to play his favorite inusical instrument quickly and english

EVEN IF you don't know a note of munic new . . .

EVEN (F there is no music teacher near your home . . .

EVEN IP you couldn't ellerd private fesaune . . .

EVEN IF you can spare only a few minutes a day, or a few hours a

EVEN IF you are "tied down" to your job or your home . . . EVEN IF you think "you look one-sical talent" . . .

EVEN IF as these things are trise of year Wildungson a first s you how to play' So quickly your reends will be amazed So pleasantly you a really look forward to each new leason So incusousively you it never miss the few cents per lesson it costs

Secret of Ropid Progress

Instead of male he you do tedfous seales and thresome every extiller C. H. Actional of Muste. Lessons I a wor is and pictures, coar le you to learn by playing rank precos-right from the start As a result out progress to amaz highposterif playing all your favors e preses by nata.

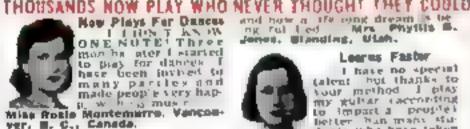
Why not lef time famous home small method being the many pieasutes of music into Till R. New Ir enos. Estra mones from pla ng Itte or tearling threater listening pleasure Posthis a be I lant carper flest of all the deep personal natisfaction of being alice to make

and Free Instruction-Sample

Let us PROVE that what we say is true See for yourself why our School has been no nuccessful for 53 years. Mail the coupon below and we'll gladly send you out valuable 36-page FREE BOOK - and ulso a Free Instruction-Rample you can try out right at home Not obligation no salesman wil call on you U. B. School of Music Studio A1810. Port Washington, N. Y. . Special Reduced Prices on instruments to our customers t



THOUSANDS NOW PLAY WHO NEVER THOUGHT THEY COULD SOUR DWG MINISTER THOUGHT THEY DWG MINISTER THOUGHT THEY WG MINISTER TH



ver. H. C., Canada.

Amazes Her Friends that I could trank plans quicky They do not be twented use. ng Imagine the reac briss when I played for them One and 'Why Legunda like you've liven playing for years' Louise Go-

"Easy As Falling Off Log"

It a easy as failing off a log have a ways wanted to play



better han many sta-

onder periods Myrella-ette Saint-Radro, Montreal Cartada.

New Famous Band Lander

I got my start in music with a L. S school tourse flow masy it is to learn to read notes and play an instrument the c (each yourself way! I se encoded my two daughters "Lawrence work, femous probestre land

U. S. School of Music,

Studio ALBIO, Part Washington, N.Y.

I um interested to learning to play particularly the instrument checked here Please send me your free flustrated book let ""How to Learn Music of Home"" | 1100 the free Instruction Sample of your simplaced words and pictures leaching meth-ON NO SALESMAN IS TO CALL UPON ME

1 M(51)

| Please Print Carefully)

Address ..

(Zone Number, If April MOTE: If you are under AS years of age parent must sign coupen.

Plane

1 Burtar

() Hawastee

Cu. tar **Violin**

Plano Accordion

Saxophone O Clarinet

Trumpet Cornet

Pige, Hammond. Reed Drean

Tenur Sanjo Unglete.

□ Trambone

D Finte, Piccolo
D Modern Elementury

Marmony

- Mandelin

O Practical Finger

Do you have the in-



"Here I am at work making good money as a draftsman I m glad I sent the coupon to Chicago Tech for that Free Trial Lesson and found out how easy it is to learn Draft log in spare time at home. Today I feel secure in my job because the draftsman's work comes first on any new project. And, in addition, draftsmen can't be replaced with machines. What's more, I feel I'm slated for promotion and more pay, because I see so many draftsmen ad-Vancing to bigh pay jobs.

LEARN IN SPARE TIME—AT HOME!

(or at the College in Chicago)

A few hours of pleasant home study every week that's all. No interference with your present job, All the tools you need; drawing outfit included. With Chicago Tech's help, you train yourself step by step. This tested method -developed over 17 years of U.L. progress prepares men quiedly for good positions in industry.



FREE INFORMATION - SEND COUPON

To prove to you how easy it a to care Drofting at home by the Chicago Tech method, we will send you the FREE method, we will send you the FREE TRIAL LESSON No charge for this lesson, now or later Fill out and mail coupon, or send post card today

CHICAGO TECHNICAL COLLEGE

N-228 Toch Bidg., 2000 So. Michigan Ave., Chicago IS, Hisola

Man me FREE casson with information about big opportunities in DRAFTING

Name. . Acc.

City State Zone ... State



GET 150 MILES PER GALLON

ENGINEERS HAVE PROVEN THIS POSSIBLE WITH MODERN CARS!

The Electronic Spark Intensifier is only one of many ways you can gain 'peak performance. The manufacturer guarantees the

following results or it costs you nothing!

More Power
Better Mil age ✓ More Speed
✓ Quicker Starting Easaw installed in the center hole of the dis-

tributor can of all cars trucks and tractors the intensifier boosts the bigh voltage passthrough the distributor giving a siter spark. The perm to a wider spark hotter spark gap which reduces mishring and consequent

ring and cylinder west FREE TRIAL, send \$3.00 cash check or money order (f bot fully satisfied return for fairefund ELECTRONIC DEVELOPMENT CO. DOES 17716 LOS ANGELS

BEAUTIFUL GARMENTS

With the New Portoble

No Experience Needed) a Actually Knitz Bearfa, Ba-

rate. Mittune and Afghana! You It Learn a Satisfying New Mobby!

mit one and afghane in to NOTHING COMPLICATED on unbreakable Pin Bar in door a house of fun and a fraced instructions. Yes and

postego. TO DAY MONEY BACK GUARANTEE IF \$3.95

Complete AIMSLIE 144. 738 Grund Street, Dept. 5, Breeklyn, N. Y.



TO LEARN ON DO

YPNOTIZ

You, Assume Man to be code. An bentle fast nating to provide feministe photos above you preclass spellished our Increations teven how endly arred methods for marriann terrol have easily arred hypno-tion to acceptant alred Because he speet hypnodial En-teriors. Next its marrian by to residential Assumption for the ten a should for against overthe descripted another of mon-at the against sound power of frameny white you steep. Fire entains of new hypothesis with an request.

Send for the exciting illustrated -- \$1 12" Phonograph Record Inducing ++ \$5 Group-Rypnotism & So f Slypnosis

MELVIN POWERS, Master Hypnotist, 1324 Wilshile, Opple 82 Hollywood 17, Cath.



GOLD - SILVER - COINS

Easily located with new Lightweight M-Scope Detector, Superior performance, lowest price, monthly payment plan. PREE LITERATURE

FISHER RESEARCH LAB., IMI. PALO ALTO

Ball-Bearing

404



Destrict, Josephers, and Manufacturers Our new prices will interest pub.

(Semi-populatio tire, but boaring) INDUSTRIAL WHEELS

Log Base. Sami-Prograntic tire \$400 til x 4 00 ... 15.15 Sanouth Base, Presentic tire and Cabe

JIM BROWN TOY COMPANY 1003 NOME AVENUE

48 POPULAR SCIENCE

FREE I Jowett's Photo Book of Famous Strong Men!

JUWETT INSTITUTE, Dept. 93-110
210 filth Avenue New York 1 M Y.
Dent Grotte: P tase that to the preprid FREE.
Juvet a Plant Bank of Strong Men. plus at 5
Muscle Di Ining Courses How to Become a Muscular He Man * ENTINEET FIND and in complete
payment for KVLRYTHING

(Please Print Plainty Include Zone Number) DRESS

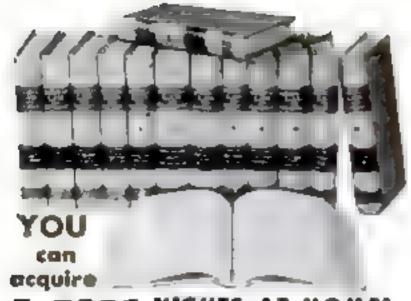
ZONE & STATE

NAME

CITT

ADDRESS





NIGHTS AT HOME! L L.B. DEGREE

LaSaile's famous Law Library—used as reference in many Law libraries and Law officeshas enabled thousands to master Law surprisingly fast, in spare hours at home, for business and professional advancement.

These 14 remarkable volumes, compiled by leading professors and lawyers, cover the whole haste field of Law in condensed, orderly, sim-

plified manner.

You advance rapidly with this great library. plus special lectures furnished. We guide you step-by-step with personalised Problem Method of instruction . . . you learn by doing -- handling legal problems—not by memorising rules.

Bend for two FREE 48-page hooklets, "Law Training for Leadership," and "Evidence," answering questions about Law and its value to you, and teding how LaSalle Law graduates are winning rapid advancement in business and public life, Mail coupon below. No obligation.

LA SALLE EXTENSION UNIVERSITY A Correspondence institution

Doot, 10831

Bend me your two	FREE bookiets	described above,
without obligation.		
Nama		Apt
Street		

City, Zone & State......

Pare!	E	NGI	NE	ERI	NG
O. 50, 4	B.S.	DEGRE	EIN	27 MC	NTHS
WORLD	FAMED	\$CH00	. · EST	ABLISHED	1884

Mochanical, Civil, Electrical, Chemical, Acronautical, Rudio (Tolevision) Engineering, Eustress Administration and Accounting. Also 36-weeks diploma courses in Surveying and Drafting

Personalized instruction. Accelerated courses. For ambitious earnest students Preparatory department

Graduates in Demand. Hold positions of responsibility the dervic Indicated. Prepare now, for the civil and military opportuni-

Extensive comput. Well equipped, modern buildings and labs. Low cost. New terms start quarterly, Enter Jenuary, Merch. June, September

TRI-STATE COLLEGE

\$101 Cullege Avenue, Angola, Indiana
Please send me free catalog and special information. I am particularly interested in courses as checked.

☐ Mechanical ☐ Civil ☐ Electrical ☐ Chemical ☐ Advancatical ☐ Radjo (Television) ☐ Business Administration ☐ Accounting

..........

☐ Short Diplome Courses

ADDRESS

If You Own a Schick or Remington Electric Razor . . .

You get a closer shave and greater comfort by preparing your face before you shave. In just three seconds this wonderful lotion "sets up" your face for shaving.

1. It evaporates sticky, rasorclogging persperation.

2. It lubricates the skin for faster, more confortable shaving.



It also lubricates shaver's cutting head for easier action, longer shaver life!



That's Lectric Shave, Only 49€, plus tax, for 3 oz.—80 shaves. Use with any make shaver. For a free month's supply send name, address to The J. B. Williams Co., (PS-7), Glastonbury, Conn.



without one pastry of investment Space time pays top maney! Sell John Hell Air-Cuchies Shoos Ditest from famous Nour England Seasony Pirastone Feemus customs — enmplote tine of men's divening solve Wamen's and children's shoes. Fact deliveries from our mammach stack department.

tern up to \$36.00 per day)

JOHN NETL SHOE CO, Dogs. 750-Brackton 64, Mass.



for PERS natures today?

Money in Hamsters

The new wonder animals from flyris Often called Toy Bears, Delightful pets. Everyone wants them Laboratories use thousands Clean, odorless, Raise anywhere. NIPW, spotted and golden breeds, We furnish breeders, equipment and manual of instructions. Write 10day for free Hibertrated literature.

GULF HAMSTERY MODICE ST. ALA.

PATTERMS

Complete stock of high quality leathcorrect supplies 4 new handbag pat-terns—tracings—photo patterns—and complete instructions—\$1.50 postage prepetd.

Sond 25c for now catalogue (defunded with first sedar). APACHE LEATHER CO.

Dept. PSX2 Washington St., Phoonin, Arizona



HURRICANE r **- O** U 1 EXHAUST

This specially engineered cut-out enables you to install special pipes and momers without removing the original mumer Now control your exhaust lone from a dash control button,

Cut back into your original muffler in restricted areas at will This cut-out is well constructed actually strengthens exhaust pipe; made of heavy plate steel, designed for easy instaliation— no special tools required. Pits all exhaust pipes from 13, to 21, size Sent postpaid for only \$5.95 check or money order. Satisfaction guaranteed or your money back.

ST. LOUIS PRODUCTS CO., Boz 24-E. Normandy 21, Mo.

FOR W*OUL*D GIVING AWA FIRST QUALITY **FULL** FASHIONED Guaranteed by Good Housekeeping OF AT ADVERTISED THE

Imagine the money you can maket Sounds impossible, but that's all they cost if they run or snag within guarantee period up to THREE WHOLE MONTHS! What's more, this amazing low cost INCLUDES your commission, huge bonus and even the postage! Here is a miracle come true!

This isn't selling, It's giving something away. Yet, YOU get paid for doing it! Yes, you not only packet an advance liberal cash commission but can easily earn a big bonus that increases your earnings up to 40%.

Women today buy over TWO MILLION PAIRS of mylons EVERY DAY. Many women average a pair a week. Stockings are hought more often than any other type of wearing apparel. Think how delighted any woman would be to learn about the amazing Kendez nylons.

It makes no difference whether you ever sold before or not. We don't care if you are 18 or 80-whether you have one hour or 50 hours a week to spare. You can make a wonderful steady income either full or spare time.

There is nothing for you to buy or deliver. You don't risk a dime. Pay nothing now or later. Just mail the coupon, that's all. We'll send you FREE SAMPLE STOCKING and complete money-making outfit

pestage prepoid. Show women hew they can save at least half of their hosiery cost and write orders. We deliver and collect. Could anything be easier? If you don't make money quicker and easier than you ever did, throw the whole works away! Con we soy more?

KENDEX

CORPORATION

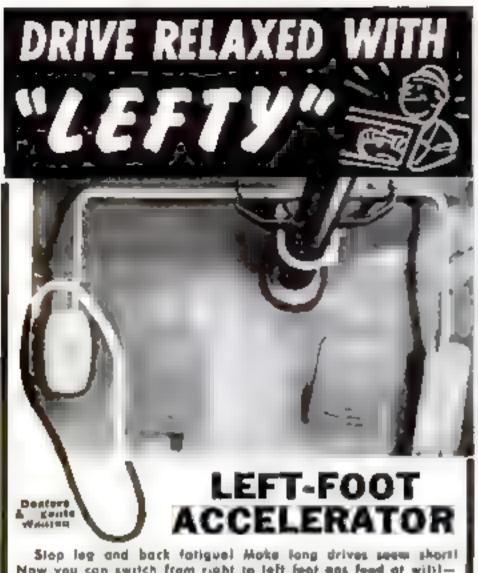
BABYLON 949, N. Y.

FREE SAMPLE STOCKING

Kendex Corporation

Babyles 949, N. T.

Send me, absolutely free and postage prepaid, your complete money-making outfit including fresample stocking. It is understood I am under no obligation and if I am not satisfied with the money I make, I will throw away the whole sutfit.



Now you can switch from right to left feet gos feed at willwith LEFTY Discover for yourself the comfort and convenience of the new "LEFTY" left foot accelerator Install "LEFTY" yourself in 60 seconds with just a wrench -no alterations to your car are necessary. Ones not interfere with light switch or regular occelerator, clamps securely to steering calumn. Fully georgeteed Salety ungracered All parts and fit-

tings included with complete instructions Bries your car up to date - make driving a real pleasure, aspec o ly on long trips. Thousands already in wie Don't daigy! Send check of money order today. Only



Specify Your and Muke of Your Car whon Ordering. No COO s, please.

INVENTORS MARKETING LAB

401-C Do Youre Suliding, 690 Market St., SAN FRANCISCO 4, CALIFORNIA

ENGINEERIN

Big Demand for Graduates

ARRONAUTICAL, CHEMICAL, CIVIL, ELECTRICAL, MECHAN-ICAL and RADIO ENGINEERING fincluding Television).

Hundreds of young men are earning engineering degrees in this recognized institution each year-continuous operamnior part of their co legs expenses in this large industrial CONTOR

Low tuition Competent Instruction. Thorough, Intense practice, program hinders saporatory fac thes including new physics for and modernized wind tunnel Individual-(xed instruction small as sen

Approved for Veterans Engineering preparatory courses Students from 46 states and 21 foreign countries Enter December, March, June September Send coupon for free cutaton and full information. Entoll now

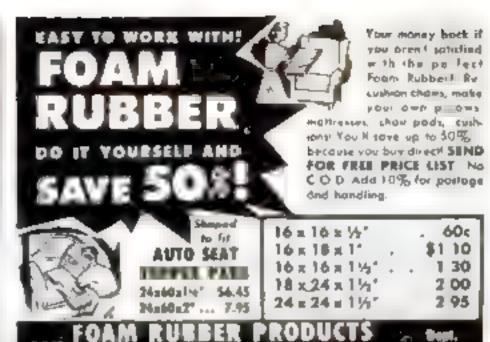
--- SEND COUPON TODAY ---

INDIANA	TECHNICAL	COLLEGE
HAILIMIAM	1 CT TIME AL	LULLEUE

4101 E. Washington Bovievard Fort Wayne 2, Indiano

Player send me free information on B. S. Engineering degree in 27 months on thecked.

	.a.	Aeronovi	Itemi, [Che	micol,		3 vi),	
п	- Hangte	ical.	Mache	intent.		allo-3	alaylala	œ.



WAY WALKIE

36 Selment Ave. • Chicago 13, III.

ELECTRONIC VOICE POWERED

No twhen, batteries adjustments literate or permit meeted Guaranteed to work anywhere up this manage to house, etc. Your own private (ath I spen phone Not war surplus Brand new Guaranteed, Two complete waits with ware - READY TO UBE:

\$600 \$1.00 rek 2015 tout and pay postoran #3 00 p pa postage charges or send #4 90 for postpadd detters. Limited Supply

THE MIDWAY COMPANY, Dept. WPS-10, Resembly, Nebrasks

PROPANE GAS ON YOUR CAR



with county operation on great tree So tell to either 1 sta la Maso o to by so fuel BENO \$2.00 for How to de 1 houstquit pricense and low just on on com, tete outflan (Refunded of partic order) of other today NIW

LPG PRODUCTS

Dopt, PU-10 Kearsey, Nabraska

Now Made Easy! Practical up-to-mechanic service sta for speculor, fig.

H shop. Sore ware dealer store in all early literaried from the first store and the posture of the first store of the first sto Nelson-Hall Co., Gept 4-1

S. Cilmine M., Chicago S.

We have taught thousands this exciting, profitable, present profession. Let us teach you in your own home, Learn Finger Printing Fireness Identification. Policy Photography, Secret Service Mathoda thoroughly quickly at attail root. Over 100 of all American Surgues of Identification otheror I A. S. students of grounders. We can properly you fur this tout unting work dur an there time Write today stoling ago, for "Blue Book of Crime."

MISTIFUTE OF APPLIES SCIENCE, 1828 Suppyride Ave., Dept. 1367, Chinaga 🦚, W.

Free Book on Arthritis And Rheumatism

NOW TO AYOID CRIPPLING DEFORMITIES

An amazing newly enlarged 44 page book entitled 'Rheumatism" will be sent free to anyone who will write for it

It reveals why drugs and medicines give only temporary relief and fail to remove the transes of the trouble explains a proven specialized non-surgical, non-medical treatment

You incur no obligation in sending for this instructive book It may be the means of vaying you years of untold misery Write today to The Ball Chuic Dept. 36, Excelsior Springs M. Samula

SAVE 40,072 on Nationally Advertised Watches Genuine Recipro-Register

Jet-O-Matic Full Swing SELF WINDING

Super De-Luse Model 360° FULL-SWING AUTOMATIC Just act it that forget it it winds likely as you wear it. Patented IMCABLOC , Jew e movemen of a nerb accuracy. WATER A SHOCK RE-LIST you can drop it band it even SWIM with it has to stainless size! acrew hagk Ballium Latinlous Marking. Unbroakable Kleegelte Crys. [4] Har the sweep second EPLIT-SECOND cal brace of FRITT-RECOMD cal branch
for precision liming. Handshifts thin case Smart 2ft7
numerate & hands CAUTION: Do not cintise with
Inferior 180° HALF swing
nutomatics! Therewer a Jet
O. Matic to 240° FULL gwing.
It wise in gh compress on? self winder! Formerly 375.00. NOW 24 93 pur 1: % tax-total 27 65. PLES-METAL band givent

B De-Luxe 17 Jewel



Check watches wanted in course being Right check or money or der for FAST prepared delivers or order COD plus postage Try ap-pr se e la lambo e days Full price back QUICK if not delighted!

Untimited Guarantes

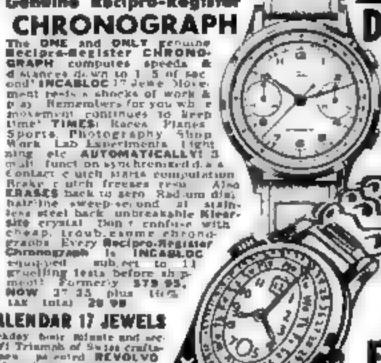
Exclusive of Party No charge ever
for the tod abor handles etc
for tifferime of hundress All
THORESEN watches subjected to
11 special tests before shyment
Sore with SAFETY the THO-RESEN WAY

CAUTION: Beware of unacture conulterature affering "UNREDERMED"
SECOND HAND natches or "EURPLUS" defective watches, All Thoresensity branches or "EURPLUS" defective watches, All Thore-

TOWN

REVOLVO-CALENDAR 17 JEWELS

Tails man h weekday bear minute and see and test with Triumph of Suite Cruftsmod (METANTLY) Triumph of Swiss cruitsmunship. Oses new pa swind REVOLVO
d at princ hir Amaring's accurs c lasto home d at Unbreakable crista. Stanless steel back the for work or special
Protected against shocks disopping etc.
by world farmin PACABLOC shock
absorber Clastenges comperison with
absorber Clastenges comperison with
any watch set ing for \$50.00. Tertific value? Cross 17.00, plus 10.00
tax total 20 72.



centle arrived from gl. guntle Se Las factacies. Gold Plate ACCURACY

MASTERPIECE of superb stying! Stream total 14 haras Ro. led Gold Pate - at a nine a steel back. Git numerals & hands Hi Bame crysta. Amating accuracy One of the amarical watches for day. Formerly \$50.50. Now yours for only 14.00 plus 1.40 tax. total 18.40.

[17 Jewel INCABLOC] 4.55 WATER & SHOCK Resist

World famous incastoci Radically different 17 Jamels! You can DROP at WEV 10 DROP at WEV 11 DANG ICI Actually runs UNDER Watter! Try it at our risk Octave Features Radium applique numerals — Stainless Prel Ferow Buch Safe ward Gaskel Sweep second Than GIVEN VILEFIER band Why pay up to 194 H * There her's sacrifice price ~ 14 95 plus 10 % tax total 18,48.

THORESEN DIRECT SALES, Dept. 7M-100

131 WEST 33rd STREET - NEW YORK 1. N. Y. RUSH watches checked on 10 DAY PREE TRIAL Remittance enclosed-send Prepaid. | Send 600 plus post. |

ADDRESS......



Tunes all shortwave radio stations (code or voice) from 540 kgs, to 30 mas, including the standard broadeast band. Hear stations from Landon, Moscow, South America, etc., as well as radio amateurs, ships, police and airports. Made by the world's foremost maker of professional radio receivers. Write for complete details and name of nearest supplier.

OVER THE WORLD!

NATIONAL COMPANY, Inc.

61 Sherman St., Malden, Mass.

CHOOSE AS YOUR COLLEGE CAREER

ELECTRICAL ENGINEERING

* MAJOR IN ELECTRONICS OR FOWER * 3.5. DEGREE IN 34 MONTHS

. STATE. .



Career opportunities are at an all-time high in Electronics, Prepare now for engineering employment opportunities predicted for 1954. This 48-year-old College of Electrical Engineering offers a proven plan to prepare you for a successful future.

Become a Radio or Electronics Technician in 12 Months. Prepare for a wide range of career objectives. In 6 ad dational months become a TV Technician

YOUR TECHNICIAN'S COURSES APPLY FULLY TOWARD YOUR B. S. DEGREE . also complete in themselves. M tary, practical or prior academic training evaluated for advanced credit B S Degree in 36 months.

> MILWADKEE SCHOOL & ENGINEERING

MILWAUKEE SCHOOL OF ENGINEERING PS-1051 1025 N. Milwaukoo, Milwaukoe, Wis.

Without obligation, send 1951 Catalog for Electrical Engineering B S Degree, major in T Electronical Fower pair Occupational Guidance Businian In Radio TV C Flectrical Power C Welding C Heating Refrigeration. Air Conditioning.

Yerse	Agt	7
Address		- 48
[117	likaanaan, aa	
f veteran indicate date of discharge	neet w	



Say You Saw It In Popular Science

Play Piano with BOTH Hands the FIRST Day-or Don't Pay!

AMAZING, NEW, PATENTED SELF-TEACHING DEVICE GIVES "SECRET"

You too, can play plane with BOTH hunds at noce. Througands have argued to play dits fast easy A B-C way. With the armedian invention, the AUTO-MATIC CHORD BY ECTOR there e nothing in 1. This is no trick method



Hous Ross Plane Course taday Conabove of (D) I materialed testings (30 course with wards and maste apecial Dean Home play at-unive arrangements and the Patrated AUTOMATIC CRORD SELECTOR Ciniy \$1.96 complete You have nothing to lose and popstory and (un to gave so mail the 10 Day FREE TRIAL evopou new!

You actually fred and play may sheet music And the Patented At TOsome Romers every note of the way No states no exercise on locing practice. You play the minute you all of the plane to to time at all you re playing lift Parage numbers, hymns, or bean stut ald hal arts of all three! Send for this marvelous



Dean Ross Plano Studios, Inc., Dept. E-6210 45 West 45th St., New York 19, N. Y.

Send Plano Course of M essons 30 songs and Patented Automatic Chard Selector the deleter will pay postman dust \$1.98 plan postage. If not delighted may relate Course in 10 days for purchase brice refund. The Agriculatic Chard Selector is into to been a SAVE MONEY! Send payment, we pay postage, Anne guarantee.

Name Address

46+OPULAR SCIENCE

Learn how to get 150 m es per gallon with your own car! Also, how ANY car can atlain lightning speed and super power. Fascingting construction drawings actually show how you can build fast stock cars. Cali-formia readsters, 200 MFH hot rods.

128 Page Over 306 IllustraCARY STEP BY STEP METHODS bein you much

CARY STEP BY STEP METHODS bely you save by be liding your own deal manifolds superchargers not cans, maner to perture by the compression hands. SO BREATH TAKING CHAPTERS TELL ASSUTTIONS of the part of the property of the p

NEWHOUSE AUTOMOTIVE INDUSTRIES, Dept. A-10 5407 E. Bener y Blid. LOS Angeles 22, Calif.

REALLY BIG MONEY

FOR A MAN OVER 30

Look at these figures: C. H Libber has averaged \$13 540 00 per year with us the past 5 years. W D. Michael carned \$16 219 91 during 12 months John Longnecker made over \$2 000 in 2 months Many others regularly earn \$5 000 and more a year. The big money opportunity is open to a man who is mature, over 10 and wi one to work a full 8 hours a day No investment required if this is the kind of an opportunity you want write me today Vice-Proudent, Dept. J-10, Box 789. Fort Worth 1, Texas



heep to seem to to to but days with our Home Rudy Course RESULTS GUARANTEED. Make Miner! De Papa at Hard Fah! His Opportunity' Rad o. Television, Store Aspearances! For Free Information regarding price and terms, WRITE.
Too most state your age Thromy talating the
FRED MAMER SCHOOL OF VENTRELOGISM
Bes 36, Studio 10

Rendington Station

Detroit 24, Michigan



ILLUSTRATED COMIC

THE KIND MEN LIKE!
THE GIRLS LIKE IT TOO!!!
(VEST POCKET SIZE) They are loaded with ture cartoons. Full of Fun and Humor, 20 DIFFERENT booklets sent for \$1 in sealed wrapper No C.O.D. Box 382-K., G.P.O., N.Y.C. 1

TAKE ORDERS FOR NATIONALLY

Big Money Full or Spare Time Starting a Cariton Cookwara Club

Hig earnings dally taking fast orders for among new kind of Stamless Steel Waterless Cook ware under Sensations. Flan that makes it easy for every honeoutle. to buy Club privileges permit your customers to get Matched Sets of CARLTON WARE without missing the money con sensational new Easy Payment ADD-A PILCE Plan PLUS up to \$8 00 worth of gift women. No experience needed, We show you everything supply everything FREE. Earnings start at once, Rush name and address. Be First!



FREE! 20-Use Set of Stainless Steel Cookware Given As a Bonus

CARLTON OF CARROLLTON, Dept. 27-5, Carrollton, Ohio



men, in every line, are boosting sales in spite of conditions - with 1/ messages-printed and illustrated in a few minutes on gov'nt post cards — with amazing new patented CARDMASTER. Your "today's" ideas, read by your prospects next morning. Not a toy, but a sturdy advertising machine, built to last for years. Low price, sold direct. Guaranteed for live years. Send name today. SEND NAME Wa'll soud PREE illustrated book of money-plote, unique advertising plane, BUSH 1 OLE NAME TODAY.

CARDMASTER COMPANY 1930 SUNNYBIDE, Dept. 1919, CHICAGO 40, ILL.

MITIGHAL MONEY BACK BUARANTE

DeLuxe Quality in Every Respect. Save about 1/11

2 AIR MATTRESS POCKETS. P.or prade water repolant weather proof that cover folled with soft huffy feathers for warmth comfort 2 flags as together to make Coubie Steeping Ead Head Flags for met weather Heavy duty att-**\$75 VALUE** around a pper lar easy a r

no Gauble nore with a ast c back no to keep out at to a and Poter Type 14 m. a 78 ch, very to corry such

Move! Kupak Filled SLEEPING BAG - \$18.95 Value Full size 24 x 28 - 00% mate expellent glanty of depot 60 ng pipper dates ing A top quality discounty buy at a hought price. Making Buck Guarantee

UNIVIBSAL INTIAPAISES — PAR 3. MAIN, LOS ANGELIS 19, CALIF.



jabel Now you can propare for a bottor paying position —ar your own humans—with this practical home trusting course-by an accordated, established school, largest of its hind in the country!

AL FURNITURE-YOU GET A COMPLETE TOOL KIT & ALL MATERIALS. ALL AT NO EXTRA COST!

FREEL Big, allestrated brochers, sample fession and details of "PAY AS

_	S E	H			Ť		£:	- MP	B	W.	ø	ŵ	M	Яr	Ħ	(3)	ä	Ψ	9	٠	-
	ELD																				
Ren	ch fi	HEE	į į	llw	etra	fee	d be	ech	HT.			pla	iem		ľ	•	-		k	d	•
44.	mė,	_		_				_		_	_	_		_	_	. 1	le	•_			
- Ad	idro	SH_								_					_						
400										w.,					_						



FCONDMICAL

buck feel No pouring no роворинд по стиголд Ресраgives your best blue theme receiv for soldering removing paint or party or any of the many uses you expect from a torch | become built once in throw away tanks with good for several hours of steady work. Propositive to use this your hatel twenges only a few concess pada 2,00° h franc where you went it. At your favorite store

Prepo Master Turch has two interchanges blo burners a pan point lairner for precision work, and a heavy-daily horner for larger work demaneing a volume of heat. Designed to fill the needs of the depranaing andustrial user

Utaity Torch produces medium mized flame for average job around shop of home I wo other models feature the same burners as the master torch. Burners of the last three torches are fixed and are not interchangeable.

140 H. Bourborn Street Chicago 2, Hilnois

FIRDIFE

Listen to this

RUSSIAN-GERMAN [TAL]AN-BRAZ|L|AN-JAPANESE

"Learn by Listening" to CONTINA RECORDS—NEW RECORDINGS, UMBREAKABLE RECORDS, Learn at home, the NATURAL WAY—quickly, staily, cheaply

Only 15 Minutes a Day!

THUULANDS have found it the most fearleating, most effective way to learn languages for Pleasure, Business, Fravel, Culture, INVESTIGATE!

Send for FREE

tent FREE, Talls just what you want to know. (ataresting, Islantented 22-page book. The Cortinaphone Short Cul.

Write Today--**NOW**

CORTINA ACADEMY (Est. 1882) Suite 1210, 105 W. 40 St., N. Y. 18, N. Y.
Pleane send me - without obligation your free book
- Pronth - Spanish - German - Matter - Brazilian - Russian - Japanese
Name
Address
City State
■ VETS! Check if NOW eligible under D.J. Bill.



SEND NO MONEY. Just mail the conpon for a complete set of 4 B.s Thick Auto Books. 20th Edition. Over 2700 Pages! Whether you are a mechanic or helper, expert or apprentice auto own-

er or driver take immediate advantage of this FREE EXAMINATION OFFER.



CAN YOU FIX IT?

These wonder books ted mtop to step there to achies my to a how to have a set of the vintam efficiency, in a ring layest topers with a near dealer and these to purpose them well covered. covered

4 BIG. THICK YOU UMES Over 27:10 pages 2 000 Blancations wiring d a-Prams. 646 Bevut fu modernistle wante 中国8年-

HOLD & PERMANENT JOS America wants its automobiles kept in good repair Men with know how are in demand at big pay These books will help you get and hold an important job or give you a chance to go this business for yourself now of later Aby man who half tries to improve himself can learn auto servicing and repairing by this quick reference method. Use the JIPPY INDEX to find easily understood answer to any auto problem These wonder have

variable illustrations. Send the coupon TODAY A year's consulting privileges with our ongineers now given with these books without extra charge.

prepared by seven of America's great automobile engineers. Many hundreds of

Publishers Since 1888

AMERICAN TECHNICAL SOCIETY, Dept. A729
brings Ave at Soft Bt., Chicago 27. Hi.
Would like to examine your 4 Volume Set of Auto Books I will
pay the dol very charges out but if I chanse I may return them
express collect If after 11 days use I prefer to keep them. I will
send you \$1 and pay the balance in the rate of only \$4 a month
unit \$24.60 has been paid. Include consulting service as offered d have

Name

Address.

City State Please attach totter stating age, occupation employer's name and address and name and address of at least one business much be reference. Men in service time blease give home address.

REAL SURE-FIRE SELLER! THUGS AND THIEVES BEWARE!

Here is a fear cas pennil gun which lischarges smothering clouds of leaving to sustaint you op, state and its appearance the quot already man or beast. A safe and effective so at the for congerous five a u.s. to permanent injury. Necoed in Stones, Banks, tutor and Huntes everywhere to protect lafe and Proper v. An areal required. Handle our test gas as a fee line and viril coon give it full time For a quick start send \$4.27 for emplete demonstrator out fit consisting of an Automate Pener) ton with 10 demonstrators and I powerful Tear tax cart idea fully pharameted Many thoussands book in use Order your outfit today Not used to ansmore. Hegen Supply Corp. Dopt. A510 St. Paul 4, Mine.

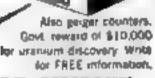
To make Crowns, Pietes, Bridgework, etc., for Dentists, Easy practical way to sarn mechanical dentistry at home in apare time FULL EQUIPMENT OF TOOLS AND MATERIALS IN-CLUDED WITH COURSE. Low tulion Easy

erms. Write for PRIE BOOK about this money making profeasion that is not affected by the machine age.

McCARRIE SCHOOL of Mechanical Dentistry 207 N. Broad Street Dopt. 916 Phitadelphin, Pa.

TREASURE -- \$10,000

New tocator detects metals, valuable materais and burned treasure. Moneyback guarantee of supersorth



GOLDAK COMPANY TROOM GLENDAKS BLVD GLENDALE 1, CALIF.

HANDW

MORE INCOME. Prestige Success Funcinating uncrowded profession business. full or spare time FREE dustrated cason & Year Book shows how men and women in home business and professions analyze handwriting to understand people, MAKE MONEY PREE lesson and Information about Unusual opportunition if over 21

I, G. A. S., Inc., 715 Witholt Bidg., Springfield, Mo.



-and re-cast junk batteries into new, with and without new materials; the latest schievement. We supply complete instructions and everything needed. But profits dully)

BATTERY LABORATORY SCHOOL DEPT. PSM. MINNEAPOLIS 4. MINNESOTA



The HOME IEMIS

A new book which shows how to set up and operate an inexpensive home laboratory with

odds and ends of material available in every home. Many thrilling, practical, useful experiments and tests, entertaining, instructive, valuable, pointing the way to research and new discoveries. Many diagrams and illustrations. Full cloth bound \$1 49.

POPULAR SCIENCE MONTHLY, Dept. 1051

353 Fourth Ave.

New York, N. Y.

LEVISION **ELECTRONICS BY MASTER** SHOP-METHOD NOME TRAINING

TODAY'S SHORTAGE OF TRAINED TECHNICIANS CREATES RONUS OPPORTUNITY FOR YOU!

Radio, Television. Electronies is a dominant factor in the national emergency. How well these essential services will on the big job they have been given depends upon the supply of trained men. Prepare yourself now to step into a good-paying job with a real future! New developments in color televi-tion, guided missiles, radar and other execfrontes fields are only the beginning! National Schools Master Shop-Method Home Training, with new y added lessons and equipment, trains you in your spare time for these last nating opportunities OUR METHOD IS PROVED BY THE SUCCESS OF NATIONAL SCHOOLS TRAINED MEN. ALL OVER THE WORLD SINCE 1905.

NATIONAL SCHOOLS TRAINING IS COMPLETE

National training qualifies you for your choice of many job opportunities in radio and television broadcasting, manufacturing, servicing, sales. Also Installation and maintenance of Japoratory electronics equipment, sound systems, pouce radio, and many others. You can start a good paying business of your own, as many other National graduntes linve done!

EARN WHILE YOU LEARN. Early in your training. you receive Spare Time Work Lessons which wait enable you to earn extra money servicing neighbors and friends' Radio and TV receivers, appliances, etc.



You receive and keep all the modern equipment shown, including send you

Let Mational Schools, of Los Angeles, a practical Technical Resident Trade School for almost 50 years, train you for today's unlimited appartunities.

POME____WYATE_



YOU ALSO

RECEIVE THE

A FASCINATING...MONEY-MAKING art career can be yours

A DOR DEL

America's 12 Most Famous Artists Show You How!



Now, for the first time, you can study art under the personal supervision of America's 12 most famous artists. And you learn at home, in your spare time! Write today for our handsome illustrated booklet that tells you all about it. It's FREE—Write today!

FAMO	JS A	RTIS	15 C	OUR	5 E
	11.5				

Dop!. 11-X, Westpart, Conn. Please send big illustrated booklet about my art career.

(Please print)

Would \$100.00 to \$250.00 in EXTRA CASH come in bandy between now and Christmas? If YES-then grasp this hand of opportunity to cash in on the great demand for these new, gorgeous eye-appealing Castolite Costume Jewelry Creations and Gift Articles that everybody likes and WANTS the minute they see them. Readers of Popular Science will like this offer'



This Camao Earring Set can be assem bled at home. Fine profits in store for you!



Casto, to 1 11 1 New at home for extra big profits?



Ren. Par ers. SUPER for gifts Get them finished or make at bome



and 0.67 and Purse Puds are beat se lers

Gat Big Profits before Christmes!

Castolite Creations come in both finished and unassembled form Best of all they are THEIR OWN SALESMEN SHOW THEM to friends no chbore others and ACCEPT Big-Profit Christman G.'t Orders Send 25c deposit for Catalog Wholesa e Price List and New Manual explaining our exciting proved Home-Profit Plan Money suturned if not dolighted HURRY! Write Today

THE CASTOLITE CO.



Your FREE ropy of 'The Law Tracted Man' shows bost to gain prestige and greater sarnings through Riackstone house law story All netruction me orial furnished including 17 volume law Library written by 65 well known law authorities. Lawyers, judges among our graduates. LL B. degree, Low cost, easy terms, Write today.

BLACKSTONE COLLEGE OF LAW Dopt 27 Chicago 1. ILL 725 N. Michigan Ave.

A Carresbondence Institution Founded in 1890.

AUTOMOTIVE MECHANICS BODY & FENDER REBUILDING OTESEL. MECHANICS TELEVISION RADIO REFRIGERATION MECHANICAL DRAFTING - BUILDING CONSTRUCTION UPHOLITERING T FOREMANSHIP FACTORY MANAGEMENT HIGH SCHOOL

CHECK YOUR FUTURE

MAIL TODAY!

If you don't like the way inflation and income taxes have hurt your income—if you want more pay-mail this coupon today' Learn how you can train at home in spare timeprepare for a successful career in months! Man, you've nothing to lose! Do it now!

Commercial Trades Institute 1400 Greenlauf, Chizona 26, Deat, £1-10

	Age
Address	
City	State



HOSEYISTS, CRAFTSMEN, EXPERIMENTERS



AUTO SEAT TOPPER PADS Prace under seat cover 2 00° % 1.55° &6 \$4° 2 50° 2 2° 64 7 5 14 % 115° 68 \$ TA. 00 2.95 ma.

Use for furniture cushion fillers mattreamen Mattream pads, cush one From Dubber a star who in any one or the shoes Send For Free Price of Immediate delivery No C O D a Add 10% for Fustage & Handling to Above Frices. Please print

FOAM-KING RUBBER CO., Dept. S-24 P. Q. Box 2676, 1174 W. Monroe St., Jocksonville, Floride

BUILDING YOUR OWN

SPEEDBOAT

Every item of marine hardware from one source. The only single supplier in America of a complete line of marine hardware. fiffings and racing equipment for full race or pleasure hydros and runabouls Write Maley, enclosing 254, for our big 32 page fully illustrated 1951 catalogue full of speedboat information, pictures and instructions

E.DEBBOLD'S

MARINE SUPPLY CO. \$ 10366 B LONG BEACH BLVD. LYNWOOD & CALIFORNIA

BOOK

TELLS

SHE ION

PAYS BIG! BEND FOR FREE, BIG. HAUSTRATED

CATALOG NOW! No obligation Graduates report making surptabled to some State and can pour news business quickly Mea, wanter of \$1 ages, Para east) Course covers Sales.

[--- No or District Adopted the Lenter Storing and the lated subjects STUDY AT ROME of In our classessens in big civics O'p area awarded. No next y home C. J. Approved.

WEAVER SCHOOL OF REAL ESTATE (Est. 1936) 18 E. Perching Road, Dupt. PS, Kansse City, Me.

WASHINGTON, Reip Stop Crime! Train as bome. Earn big money. Amusing training course from the NATION'S CAPITOL (center of law shiorcement) by former U.S. GOVT AGENT and NAVAL INTELLIGENCE Officer exposes actual methods used by Criminals. Write for FREE BOOK State are

INTERNATIONAL DETECTIVE TRAINING SCHOOL 1701 Monree St , N.E. Dept. 3110 Washington 16, D. C.

Kit to a Home Redto Course in kit form. No pre constitues tendenced pe of radio is required. No add tional parts neces ar. Thors the forseq have no to how

the furthers. Theory, Printical Work. Trouble shooting are taught I sed in man) rauso or mole Excelent back ground for television

hit fortudes all parts, fustructions red o tester electric soldering scott, rouble a maying guille quizzes, telectains book, consultation service \$10.05 is complete price Nothing the to buy Everything you build is yours to keep All parts and equipment guaranteed

Order your kit today, or send for further information. You risk bothing, 10 Day Money Back Guarantee

Postage prepaid on cash orders, C O D orders accepted to U S A.

PROGRESSIVE ELECTRONICS CO.

497 Union Ave., Dept. P 5 -1

Brooklyn 11, N. Y.

You Can Make

and Build a Profitable Community Enterprise

Farm drainage, home building, reclamation projects, highway construction. From these and other sources come the biggest demand for drain tile in history. More local plants are urgently needed.

£2

Millions of dollars' worth of drain tile are used annually. Much of it, ordinarily, is shipped from far dutant points, least manufacturing is economical, logical, profitable. The Chempton Drain Tile Machine makes manufacturing easy. Pares production costs. Requires no skilled labor. Makes all sizes from 3" to 12". Yet requires only a moderale investment.

Outstanding Manufacturing Opportunity

Champion-made coment tile are dense, strong, and truly round. No distortion, no shaling. Worth more than clay tile, but our be sold for less — and still leave a handsome profit mergin.

Write for the DrainTile Book. Tells about osment tile as a local manufacturing enterprise. Tells about easy-payment terms. Write today.

Concrete Equipment Company 521 Ottowa Ave. Holland, Michigan





Wat	tehmakers
2 [WANTED!
3	Learn this high pay trade. Copy- righted Sweazey System shows you how quickly, successfully. at home or in our Chicago School (founded 1908). We furnish tools, sup- plies, practice watches for home study course. No previous experience needed. Try it without obligation!
5 FR	EE SAMPLE Home Study LESSON

Approved resident courses include chrono-

graph repairing, jewelry repairing, gem setting, and jewelry engraving. Write for full information.

CHICAGO SCHOOL OF WATCHMAKING				
1608 N. Mil	waukee Ave., Dept. 4101, Chicago 47, III.			
Send	Free Sample Home Study Lesson.			
☐ Send	Free Catalog of Resident Courses.			
NAME				
STREET				
CITY	ZONESTATE			

Make Money Selling SERVICE SHOES Direct to Fellow Workers!



Would you like to earn from \$15.00 to \$60.00 a week EXTRA in spare time? Take orders for Consolidated's sensational service shoes wanted everywhere! Sell to people where you work - to service station attendants, factory workers, barbers, waiters, to friends and neighbors.

17 SPECIAL TYPES

Now, a wonderful selection to choose from? Rugged Horsehide Shoes, Steel-Toe Safety Shoes, Gro-Cork Slip-Resistant soles, and the long-wearing Service Shoes, pictured above, with DuPont Neoprene Oil-Resistant soles and heels, and famous Velvet-Ees comfort features. Notice the special air-cushion insole and instep arch support. Marvelously restful for people who are on their feet a lot. Also, all kinds of Dress Shoes for men and women - sizes 4 to 16, Widths AAA to EEEE, See how easy it is to make extra cash for yourself while beloing fellow workers save money -from-factory prices!

WE SHOW YOU HOW!

You don't need experience, we show you how to become successful! You get a Free Selling Outfit, and our famous Automatic Selling Plan that helps you make HIG MONEY from the first hour you start. Don't

delay a minute - rush coupon now!

Gwaranteed by

The secretaries with



USH	COUP	N	NOW	Good He	Azereabiy
0311	COOL	//4	4 11	100	

CONSOLIDATED SHOP SYSTEM Dapi, (3.34 Chippewa Falls, Wis.

I want to make HIO MONEY taking orders for popular Consolidated Shoes. Please rush your great Sales Outfit, including Special Service Shoes and Demonstrator, with

everymonia mar I made to get state	ONG THEOTHE SERVICE
Name	***********
Address	
Town	State

Do you want a SUCCESS - WINNING AOICE 3

Give the Feuchtinger Voice-Method a Chance to Help You Develop More

> POWER VIGOR

CHARACTER

IN YOUR VOICE

I can strongthen your

votes-build it up to be one of your most valuable access Get the ring of confiquece to have seits and It will help you get shoud in business, increase your Acems, develop leadenhip

Eugene Feuchtinger

Add controlled atrength to your voice and people will listen when you talk. A stronger verce may make you what you say will have bore importance when your voice is full-timed because people generally respect a BIG voice.

THOUSANDS ARE HELD BACK BY A NEGATIVE VOICE —AND DON'T KNOW IT!

Your popularity and recognition depends, frequently on your voice and the impress on it makes. Don't be handicapped by just an ordinary common weak voice. You! improve your desirable strength And of course I don't have to remind you that a positive voice has dollars and cents value to salesmen executives union leaders proachers posticions announcers and anyone one who wants to convince people

FREE DETAILS . . . JUST FILL IN COUPON BELOW AND RUSH IT BACK TO ME TODAY

You'll find this lenting enjoyable as well as as uable as have more thin 13 and in only open if an abudents that no be past 32 years the past is your about any our shap of sail training feel to provide the past in the past in the order of a past at a past a past at past at past a past to be well and a past to be well and a past to be well and a past to be the well and a past to be the well and a past to be the past to be the past and a past to be the past to be a past to be the past to be a pa

PREFECT VOICE INSTITUTE, Studio K-1 210 South Clinton St., Chicago &, Ill.

J	REE "Successful BOOK!	A MAIL
σ,	Profect Voice Institute, Studie K-1 210 South Clinton St., Chicago Q. Hi.	COUPON
	Please some me feer and without obligation suffree may the and belieful book of How to a cooking the More Successful to Foucht high May, in place with proper No sa commit	will cari
	NAME ADDRESS	
	CITY STATE	



STARK'S

Dept PS-10. CHICAGO S. ILL.



eedwriting



The real dadio Mike? A prive in a prive full instructions given? Swell for a parties?— (at in? on or "kid" regular network programs or put on your pwn branchestes Amere your friends front time!

It may full that he there is a high!

SEND NO MONEY dust my passing a 191 for jules making or cond to be put of the put of t

Midway Co , Dept. MPS LO, Hoseney, Nebr.

Rupture Troubles Ended

Advanced method has healed thousands. No leg strape, no elastic, no plasters. No pressure on hips or spine. Plexo-pad Entirely different. Endorsed by doctors, mechanics, clerks. Very light INEXPENSIVE GUARANTEED. Write for information and trial

SMITH MANUFACTURING COMPANY Deat PS, Preston, Ont Cun.

OIL FILTER REFILLS 10c



CORF Q 729

Here's News! Ordinary toilet paper makes an ideal oil filter. Laboratory tests prove It cleans oil faster and better than popular makes of filter elements. All you need is a simple set of RETLIF ADAPTER PLATES . and you can start using ordinary tollet paper rolls in your present oil filter. For proof and descriptive literature, send name and address to

RETLIF CORPORATION, Dept 94

1239 No. Highland Ave., Les Augoles 38, Calif.



WANTED-men with ambition and desire to get shead and make money in something for themselves. Act now-do as thousands of successful men have done-start on your own in floor surfacing with American Machines!

Take advantage of this opportunity if you want steady year round work-earnings of \$25 and more a day-pleasant indoor working conditions—and a lifetime of comfortable living for yourself and your family. No schooling-no experience needed. Sanders are easy to operate. Hundreds of prospects—new and old homes. Send coupon for "moneymaking" booklet entitled

"Opportunities in Floor Surfacing"-enclose 25c In coin of stamps to cover handing.

The American Floor Surfacing Machine Co. 532 So St. Clair St., Toledo 3, Ohio

Enclosed find 25c in stamps or coin for hocklet 'Opportunities in Floor Surfacing . telling me how I can start my own floor sanding business

Name -

MERICAN **FLOOR MACHINES**

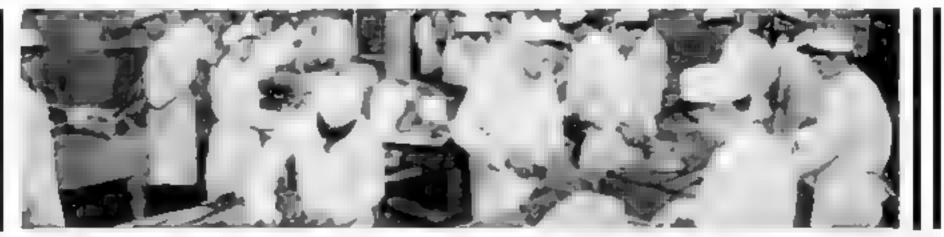
Agronautical Tachnology Pilot and Specialist Master Mechanic

The avention industry pregently needs properly trained young men for estantial diviling aviation positions. Embry-Riddle office maximum training in minimum time, Fufly actrodited 8-me, to 26-me, courses in all aeronautical phases also aid rapid military advancement if called to armed forest. Thorough, practical instruction backed by 25 yrs, experience training today's avention leaders. Complete school enempes De prepared. Enrall new! Illustrated ratalog, address EMBAY RIDDLE DEFY DI, MIAMS 30 FLA REGISTRAN,

Best Serves Your Country & Yourself

TRAIN IN MIAME .. AIR CAPITAL OF

LEARN MEAT CUTTING AT NATIONAL Pay After Graduation



The steady dependable trade of Ment Cutting taught easily in 8 short weeks. You LEARN BY DOING under actual meat market conditions in hig modern school at Toledo.

For beginners or men with experience, Get a profitable store of your own. Remember, PEOPLE MUST EAT! Big pay jobs, Free employment help, Thousands of successful graduates.

Buying, cutting, percentage, pricing, advertising, selling, etc. A complete retail meat education. National School established over 25 years. Get National training NOW. Pay your tuition in easy weekly payments after you graduate. G. I. approved. Send coupon for FREE 52 page school catalog-IODAY.

	A Toledo	f Most Cutting, 4 Obio	inc.

pend the your FREE school cathog on National Training at Toledo in Meat Cuttons, Now Merchand sing and Sulf Service Meats. No obligation. No subsequent will call

Address

City

Check here if Veteren of World War It



quickly pays for itself in savings

You see at a glance how to keep your motor at gas-saving speed. You're warned at a glance of faulty motor performance—faulty spark plugs, valves, timing, piston rings, manifold, muffler. Same accuracy used by factory trained mechanges. All in plain sight on illuminated dial. Made by Stewart Warner, the most trusted name in precision automotive instruments. Only \$10.95.

Ask Your Dooler Now! Or Write

Stewart-Warner

Instrument Division, Dept. P-71 1840 Diversey Forkway + Chicago 14, 11L



with order for a New Model 50

Measures A C and D C. Voltages. Cirre t. Resistance, etc.

" Then have the current consumptant while the appliance under test is in operation. The apparate or a 'v may be plussed directly to the front panel receptatio A ea a characteristic etc. Incorporates a sensitive directread is resistance range which not rolely measure all resulu . e. e namonly used in electrical suctors etc Continuity 4 6/51 57 A HE GODENS.

 W | test thermostats, radio tive filaments, builts, fuses, aprescents. condensers, switchen, field colls, circuit breakers, lighting systems, etc.

ladsoma rownił gognocuji moldod hakolita cusu 31/4" u 📲 51/4" x 21/4". Complete with all fast loads and instructions.

SOLD ON EASY PAYMENT

No interest or carrying charges added. Remit \$3.90 with order, pay balance, \$2.00 per month for 3 months. SUPERIOR ELECTRONIC CO., INC.

Dopt. B-34 = 227 FULTON STREET = NEW YORK 7, M. T.





SID SALE TOP RADEO OF ITALISTS PROBLEM TO ACTION ASSESSMENT OF BASE OF HIS HELD BY LITTRICATE PROBLEM OF HIS HELD BY LITTRICATE AND AND ANY NEWS BY FAR OR NOTE IN TOATS!

HIS SI PARK AND ANY NEWS BY FAR OR NOTE IN TOATS!

HIS SI PARK AND ANY NEWS BY FAR OR NOTE IN TOATS!

HIS SI PARK AND ANY NEWS BY FAR OR NOTE IN TOATS!

HIS SI PARK AND ANY NEWS BY FAR OR NOTE IN PROBLEM CAN'T BE BE ONLY TOATS AND ANY NEWS BY THE PROBLEM OF THE PROBLEM

POINT PLEASANT, NEW



persons who are was ing money and not go roper gas mileage the Mileague tells in at 1991 ill be plussed to learn how to save gas the VACU MATING over-rich mistures. VA. IIby VACU MATING over-rish missions. It is MATIC fits all cars, trucks and tractors. It is axiometic and operates on the supercharge principle. Easily installed to a few minutes.

BALESMEN WANTED! Big Profite? Bend hame, address on penny posteard for free particulars and how to get yours for introducing.

VACU-MATIC Co., 7617-1788 W. State St., WAUWATORA, WIR

SHOE REPAIR OFFERS BIG INCOME

You can learn to be a skilled shoe repairmen by actually working on shoes and modern machines The only practical school in t & Est 1927 Big 24-Page Book explains everything Write Dept. P8 for your copy today

MODERN SHOE REBUILDING SCHOOL 806 So. Figueros 64., Les Angeles 17, Calif.

Sensational Device Tests Eyes



Big news to the millions of Spectacle Wearers and Prospects. Means Freedom from Outrageous Prices. Sold on Money-back Guarantee

MAKE BIG MONEY QUICK with SAMPLE KIT! Show it to friends and others. Let them use it Free and watch their amazement over this Self Testing system. Here is a great new opportunity in a trement us new field of unlimited possibilities Spare or full time. No experience needed. Write for complete sample kit. C.G. Outloof Co., Deat. A-103, 29 E. Delaware Pt., Chiesge 13, 111.

THORESEN'S HEAVY DUTY VIRGIN VIN



The ideal garage—it travels with your car see at the reverse of anow sleet rain aun salt air etc. Which on and off quick and easy for its anomal of the seem of th

Compare with others selling for \$14.95

Trust Thorseen's to give you honest to gowlness we use This low price made possess to give you honest to gowlness we use This low price made possess to give your door for order C O D plus postage THY 10 hat 8 AT Of R hisk Absolutely guaranteed? Your III (ii) quickly refunded if hot thoroly astracted?

THORESEN DIRECT SALES, Dopt. 7-L-140 131 West 33rd Street, New York 1, N. Y.



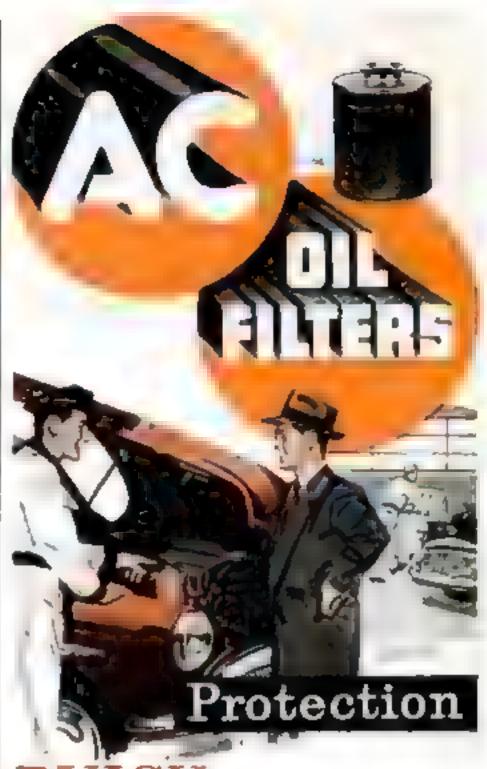
YOUR DIREAM HOME-

HOW TO BUILD IT FOR LESS THAN \$3500

CAVE up to 13 000 with help of this practical how-to-do-it SAVE book! Prepared by Handyman" Hubbard Cobb and other experts Plans and instructions for eight modern homes! Book also shows how to make every type of improvement Foundations, Frame and Sheathe Roof Set in Windows, Doors Inside Partitions Install Plumbing Heating Wiring and more! 576 big 5'4" x 9'4" pages, 650 illustrations, 2 colors throughout! 755, 306 copies sold! Only \$3.95. Mail postal card for 7 days FREE Trial today! Wm. H. Wise & Co., Inc., 30 W. 47th St., N. Y. 19, N. Y.

Buy U. S. Savings Bonds





"Fireball" Engines are Factory-Equipped with AC Aluvac Oil Filters

Buick "Fireball" engines are world-famous for their ruggedness, dependability and long life. AC Alwood Oil Filters are standard, factoryinstalled equipment on all Buick models.

AC Aluvac Oil Filters are today's finest means of engine oil filtration. The specially processed Aluvoc Element has 10 times the filtering area of ordinary elements. Alwoo material is so finely meshed it stops particles 1/100 the diameter of a human hair.

Aluvac keeps durt and sludge from clogging rings and valves, damaging bearings and moving parts—as never before. It gives Buick owners added engine dependability and even longer engine life.

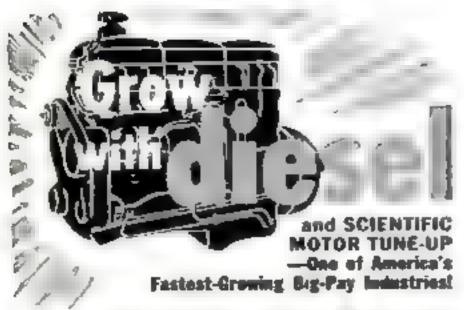
You, too, can have AC Aluvac protection, for AC makes *Aluvoc* Elements for most all filters. Have your service man install one in your car,



GENERAL MOTORS COMPONATION



IF YOUR CAR door not have an oil filter you can got a complete AC unit with Aluvac Element at moderain cost, Ask about it next time you change all,



Get ready now Make a place for yourself in the mighty Diesel Industry. Be there to take advantage of the opportunities shead. The U.E.I. Plan for learning Diesel is simple, practical and is based upon the principle of learning-to-do by-doing. Includes Auto Engine Time-t p You get fundamentais through sparetime home-study, followed by actual shop practice on modern Diesel engines. Experienced instructors guide you step-by-step-you learn the HOW and WHY of Diesel operation, service and maintenance. Get all the facts-mall the coupon and we'll send you a free copy of "Earning Power in Diesel" Mail coupon today!

UTILITIES ENGINEERING INSTITUTE Dogt.DM 11 (Foundari 1927)Chicago 14, III.

UTILITIES ENGINEERING INSTITUTE, DEPT. OM:11. 2521 Shotfield Ave., Chicago 14, Illinois

Please send me, without obligation, your FREE book. Earning Power in Diesel.

NAME (print)....AGE

ADDRESS

CITY State

Check here for information it you are under 17

TV SERVICING AT HOME-THIS EASY WAY

WITH H. E. CIBIN'S MAPID "TV TROUBLE SHOOTING METHOD"

Without experience of knowledge, this guaranteed new method of applicable IV acts sign is post to DEA NOSE TV from design at modelly no an expert NO TREORY NO MATH you can borste all faults in record-breaking time, regard see of make or model

"TV THOUSE, HICOTANG METHOD" is the most valuable and to TV servicing ever wit en. I, shows you how in reput your own and your friends, mate, So a TV Trustell Diagnost can, increase your present currients Open your own Profilence Sustained of get a bighpastne phi sed jab

Nothing more to Pay-Nothing side to Buy MERE'S NOW CISIN'S TV TROUBLE SHOOTING METHOD WORKS,

You impost the PL'TI RE-over 85 picture frombles tares states excesses from picture Austral' to WPAK

You imper not bright spaced rectangle-it halled photors tuned out Over 34 states troubles that a state troubles

You taken to the NOUND It mand troubles from angual ARSENT to WEAR up taken alphabetically

hard fighter has a CHT's number or latter and when these 2 are put logs for they tell you ERACYLY WHERE the trouble to. Then step by step hard-tions forced by the Artist Childhab, could you to find be for ty pur!

13 IMPORTANT PRELIMINARY CHECKS MEED NO INSTRU-MENTS! If he is known here's OVER & ALSO REQUEST NO STICKENTS lapon breke whole emergency checks for distorted believes defortive tubes for the ne PIX labe, also SI where ALL NYI AND IN SAMPLE LANCE AND PREPORTED AS A STORY CHECKS USE THE PUTER TO BE AS A GUIDE

II. G. Clean the au here is the inventor of the Af DC oridget radio. He i crosses RCA ATAT etc. He has now (raised thousands of technicians now owning their own prospersion TV service organications of food ing highly paid TV posts, in a 1's years of extra entry are embedded in this remarkable new TV TROUBLE SHOOTING METHOD.

GUARANTEED, MONEY BACK IN 5 DAYS IF NOT SATISFIED.

Send your name and address today! Mail this coupon with only \$1.00

RUSH COUPON NOW! N. O. Cisin, Consulting Engineer 200 Climton St.. Dept PS 3 Brooklyn 2, N. Y.

Nume or a second or a second or a Address

State . City . . Zone

MERC'S PROOF; J E. Se ter Ch ragn, writest ! Hash another cops Am lickled to death with re-

in the state of th under petred. tremel) Very ingranous in its log cal use of runes and effect should be in ap-ery TV tool alt



BLOOD PRESSURE GAUGE



for HOME USE NOT A TOY Keep check on yourse ?! Pre-vent strokes, kidney damage, etc Manual has full detens on what is prescribed in 95 % of All high blood pressure cases Unit includes a Blood Pressure Gauge, Arm Bandage, S.eeve, 2 Valve Bulb Base, Stethoscope and 25 Grams of MERCURY Easy to operate Complete suffit sent prepaid for \$5.58 or simply sand from and address and pay \$5.58 plus C.O.O and portal charges on arrival.

JOY SPECIALTY COMPANY Scientific Instrument Department 2220-0 W. Hubbard St., Chicago 12, No. "Send fur Free Ctrouter



NEW TINYTONE RADIO

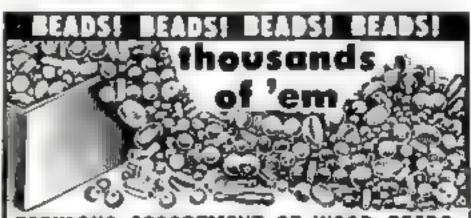
Really Works—World's Employed Carry in your picket New Preset Crystal of pill nates All Tubes. Safferies or Electric "Flug-ins" Forever Award band dist—
Resurful Red I as to case Guarantego To Work on local stations—
— use most anywhere home cabine, farm, etc Send Only \$1.00 (bill ch., in o.) and pay postman \$3.00 COD, postage on arrival of send \$4.00 for P P, do, very, COMPLETE WITH SETTAL LONG OFFTANCE HOME, LIMITED SUPPLY—20 ORDER NOW!

ACRIAL KIT AMB MIDWAY CO.



power marker that the power marker that a factor served erration on oil cure, light bracks tractors one age, make or model Absaring theretoes may pay the district the said earliest the course gas consumption only actually pay for district in raid earliest it can be phere for in a life gas rai could course the total days on your own tow before deciding. From for powerelf unitetaining benefits of new naturals development by actual day-by-day experience on the raid of the new market at the first wife or wire techny for little density, technical dayshington and so day it can nation Respect 6 and, \$5 NO NO MONEY.

9. 8. SCHUYLER Dept 310, 2004 20th \$1., Serielly, Calif.



WOOD BEADS FABULOUS ASSORTMENT OF

Atlistes, atlishapes, all culpri wires to each passer \$60 PPD water old it eyes in mile that you we bluck provide the and resolves in the

Send Cash, Check, M. O. Satisfurtion Guarattleed

WALCO BEAD COMPANY 37 West 37th Street Dept. PS New York 18, N N World's Largest Supplier of Beads for Cru I Purposes New York 18, N Y

LIFETIME WRITTEN GLIARANTEE!

FORMERLY SOLD FOR P SHOCK

WATER & DUST PROOF

Warn by ARMY, NAVY & MARINES Lum nous stal aweep second hand Super Accurate Imported Swiss these brists now LIFETIME QUARAN-TEED watches now for a small frac-tion of the original trice. You save \$14 because we bought-out surplus storal Don't delay.

10 DAY FREE TRIAL!

WEAR AT OUR RISKI

Money mack is not belighted, SEAD GNLY BY LOWN SALMENT with under Pay balance to postmen on are the plus postage. Send check or M.O. for full amount and we pay postage. Men a Sivile B14 05 of the B1 31 par total \$16 45 kml as and nurses style B14 95 plus \$1 76 tax total \$18 65 Order now at this low juice.

FREE! Handsomy Expansion Sand with Order

MARYLAND DISTRIBUTORS, Dept. 298

501 E. Saltimore Street, Saltimore-2, Maryland

WRITE FOR FREE WATCH AND JEWELRY CATALOR AT ALMOST WHOLESALE PRICES

"THE WONDERS OF CHEMISTRY"

This exciting new book shows how to amass your friends with chemical magic describes many fastinating home experiments, tells of fun, thritis and big future oppor-tunities for boys who know chemistry. Special stomic funities for boys who know chemistry pairing feature. Bend today

THE POSTER CHEMICAL COMPANY Hagerstown Maryland \$1 Prospect Avenue



MOOLL



SPORTONE MUFFLERS

Ford & Chevrolet 5 4 45 All other popular core 5.45

15.95 V-8 Qual Sets

Chramed Scientips Please state make & year of cor on all orders

SANDEE MUFFLER CO. 5643 Corryso Place & Culear City, California



A selection of figure studies in breathtaking 3rd Dimension. These pictures come to life when viewed through the magic viewer. Realistic depth and beauty only 3rd Dimension can provide.

Send 25c for Magic Viewer & Samples

FREE LISTS

LOU TAGER 5 50 14) N, Lu Sree Ave, Les Angeles 36, Celii

Dept. US-6

HE Mailed This Coupon

CHARLES ATLAS 115 Seed 23rd M, New York 18, N. T. I went the proof that your system of I went the proof that your system of Pyramic Tension will help make a bestupy. How blue of me-gives me a bestupy, ment Sent you your free beach, "Ever ment Sent you your free beach, "Ever leading Health and Strongth." THOMAS MANTAS Andrew P. F. W. Fr. Print glabely) Blate MY. ...and Here's

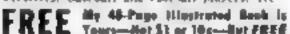
the Handsome

Thomas Manfre of New York mailed my roupon Got my free book. Was my Attas Champion, Sier ng Silver tup. He sate Look at my NOW! Dynamic Treatme, with the natural entry way you made me up. Alfan Champlon.

Let Me Preve I Can Make You a New Ment

Would you like accurer development -a muscular tool ? They listen I was once a ?" In weathing Virall to Built haltened to be seen in a swimmin ng suit. Then I herevered the secret that changed me World's Most Lerfeetly Detecoperal aftern My secret to Designation Tension " He purpose to to give rou powerful thip he muscles you like to see in sour as more had for those with systems storgetch from nek of exercise to help len tone up their entire body inside and out.

Only 15 Minutes e Day Ny method I manner Tranton in a little to the search of theory every exercise is peached about 13 minutes a day in your one hame From the very start, you if the aster my method of International although the day we have every minute of the day-we have the beautiful and the fill and the peach to be seen to be rectally and the manner area of the second which manner area of the eventues, beautiful and football players, eventues, beautiful and football players, etc.



Send for my book, "Everlanting Rica in and property with as un) phoper e for his felow who wants a heat yours lith Et limb com-

CHARLES ATLAS New York 10, N Y

State

CHARLES ATLAS, Dept. IR 115 East 23 Street, New York 10, N. Y.

t want the proof that your system of "By-camic Feenlas" will help make a New Man of me five me a healthy husky body and big muscle development Send me your free book, "Everlanting Health and Strength."

(Please prim or write plainly) Address. ..

CIGH



Twice winner at tolder of "The World's Most Perfect-ty Daveleped



Spot <u>ANY</u> Car Trouble



Table how to Spot 37 Agreematic Transmission Transfer 3 Courses of Custometring Had Notes 52 Courses for Nurths "Misses 55 Courses of Excensive Off Countypylote 14 Courses of Excensive Off Countypylote 77 Checks for Clutch Transfers. 46 Courses of Exert Acid Transfers 11 Courses of Exert Acid Transfers 12 Checks for Faulty Purings and March Absorbers 44 Different Transfers of Wheel Transfers LOTS MORE.

in a Jitty!

Handy Guide Helps Find What's Wrong Fast!

Don't waste time and work trying to track down car and truck troubles. Let MO-IOR s new TROUBLE MOOTER help you find them t AST Prepared by Editors of famous MOTOR's Manuals. Lists 1700 specific causes of auto-touble—knocks, misses, noises, breakdowns, etc. If car has

Connecting Rod noisejust turn to Connecting Rod
bection for the B things
that can be wrong. Covers
engines, clutches, brakes,
ignitions, new automatic
transmissions, etc. Fits right
in pocket for instant use
bpiral binding lets book
stay open while you work.
Cross sect on PICTURES
Valuable help for beginners, experienced mechanics.

Deposit \$1 with postman, plus C.O.D., chgs. on delivery. Use 7 days, if not delighted, your \$1 back. (SAVE COD Chgs by sending \$1 now.) Write MOTOR Book Dept., Box AC., 250 W. 55th St., N. Y. 19, N. Y.

New Amazing Invention-"Magic Art Reproducer"

DRAW THE FIRST DAY!

NO LESSONSI NO TALENTS!

Complete for only

FREET "Simple Secreta of Art Trinks of the Trade"

Trinks of the France
This is noted to the least of the pours Fight, with order of a stage and a stage and the product of the p

Free 10-Day Trial

Just well gauge that andress Pay postman on delivers \$1 98 pus postage. Or send on y \$1 98 with order and we pay postage. You must be can vib ed that you can draw any thing like in artist or return and your money will be rehanded.

Norton Products

You Can Drow Your Family, Friends, Anything From REAL LIFE—Like An Artist Even If You CAN'T DRAW A Straight Lines

Also Excellent for Every Other Type of Drowing! a Numan Figures a Outdoor Scenes, landscapes, buildings a Still life, vases, bowls of fruit lamps, turniture all objects a Copy photos, other pictures, portraits, etc. a Copy blooprints, designs decorations, etc., for moodwork grachine for needlawark, cracheting knitting a Copy all carteons.

Yes anyone from 5 to 80 can draw or sketch or paint any think new the larger Art Reinoducer 1 to a professional action to matter how

securodicar like a grafes stand artist he matter how hope are you high sou are! Anything you want to draw is automatically seen on any alive of paper instantly? Then easily and quick y for ow the bors of the picture image with total pencia and you have an accurate original drawing that anyone would think an artist had done A so makes drawing tarter or amatter as you wish Anyone can use it on any lesk table board ric indoors or outdoors? Swoother

Indoors or partice or talets
perced
perced
property

Have full be popular! Every une will ask you to draw them tog if he in demand: After a short time you may find you can draw well without the Magic Art Reproducer" because you have described a knick and feeling attletahave which may lead to a good paying of cureer

Dept. 4410, 206 Breadway New York 7, N. Y.



Me are how to import at low a cign mare for your local buyers. No previous aspectance needed Big profits possible on stock investment. World-wide Import Export bushess trees your own home by mail order apara—lub little (Example of money saving prices at left) Big cavings on algithes, tools, and isques, watches, thins, pilh, pays, etc. Orient. PHOD IMPORTS FREE last of imports from Enrape—Orient. PHOD IMPORTS of Trade world wide from small towns of the day he risk encounacion. Write today for PREE details and list. Aurusal reaches a premight. Mellinger Co., Exporture-Importers, 1715 C. Westwood Bird, Los Angeles 24, California.



1952 EDITION

It a New! It's Different! Get world's largest Auto Accessory & Parts Catalog and save money Over 50.000 items, including Hollywood Accessories, Hi-Speed Equipment. Rebuilt Engines, all parts & accessories for all cars & trucks We have that iterd-To-Get vart' Jam packed with bargains Completely Il ustrated (100 pages) Send 25c (refundable)

. C. WHITNEY,

1917-F Archer,

Chicago 16



"FALSE TEETH BE DAMNED!"

If that's bow YOU feel - because plates step and rock and cause sore gums - try Brimms Plasti-Liner. One application makes plates fit swelly and stay that way, because Brimms Plasti Liner is a permanent reliner. It relines and refits loose



plates in a way no powder or paste can do. Even on old rubber plates you get good results six months to a year or longer you can tay anyymmas Simply lay soft strip of Plasti Liner on troublesome upper or lower Bite and it molds perfectly Easy to not, tasteless, odorless, harmless to you and your plates. Removable if desired. Money back if not completely satisfied. Ask your draggest!

BRIMMS PLASTI-LINER .

EARN WHILE YOU LEARN

You receive Spare Time Work Lessons, which show you how to earn while you Learn .. for extra money and experience. You Learn by DOING

EDUIPMENT TOOLS



To make your training complete. we give you selected mechanic's tools and equipment, including allmetal toolbox -- as a regular part of your instruction

trained Diesel-Auto Mechanic highways throng with cars, busses, trucks, tractors, garages and Service Stations are busy factories, ships, farms, railroads general industry are dependent upon engine power Here's a dynamic fast-growing field that needs framed men who know ALL phases Installation, operation, maintenance and repair Now - National Schools offers you a practical allembracing Diesel-Auto Mechanic's Course, including

Opportunity is everywhere for the

Complete training in Diesels. High Speed and Heavy Duty, Semi-Diesels, to ohne and Special Fuel Engines AND Ailied Mechanics.

As a National Schools graduate, you are trained for ALL opportunities in the Diesel & Auto Industries.

Jobs Like These Are Available to TRAINED MECHANICS:

Diasel Feel Injection Automotive Mater Tune-up Diesel Engine Robuilding General Garage Mechanit Agricultural Implements Auto Engine Rebuilding Auto Elect. Service Public Utilities a Party Dealers Bus and Truck times Industrial Maintenance Contracting & Excavating Business of Your Own AND many other similar openings,

NATIONAL SCHOOLS



ETHOD HOME TRAINING

4000 South Figures Street or paste on bas Angeles 37, Caldernia penny postcord) Ma I me FRFE the book. MY PUTURE IN AUTO-MOTIVE-DIASEL MECHANICS, together with the Sample Lesson I understand no salesman will call

NAME	 	AUE	
ADDRESS			_
CITY	 JONE	. NTATE.	

BOOKS TELL YOU HOWI New Historial book and sample lesson

THESE

2 FREE

those how we been send for them Individual in the second

Amazing Attachment MAKES OLD REFRIGERATORS INTO MODERN Automatic Defrosters!

Thirty Million Prospects. Sell without "selling pressure' on sensational Free Trial Plan. Just plug it in and leave it. Frees women from drudgery and mess of defroating. Saves electricity. Keeps food longer, better. Gives longer life to refrigerator. Secret "follow-up" Plan often brings five additional sales by making every user your agent. Big season now on!

SENT FREE ... JUST SEND NAME!

Don thend a cent just your name on penny postcard. We Il send you the biggest money-maker you ever got your hands on and guarantee your sales at profits as high as \$5,00 on each sale. Rush your name!

Women buying by the thousands!

Salesmee Cleaning up on "Free Trial Sales Plan Sent Free with Instructions.

Make as high as \$5 on Every Sale!



West Hubbard Street, Dept. 0-919, Chicago 10, Illinois

MIDGET MOTOR

DRIVES MODEL PLANES, BOATS, CONSTRUCTION SETS, Etc. WITH AMAZING SPEED! RUNS ON FLASHLIGHT BATTERIES!

BOYS! MODEL-MAKERS! Get this new MICHTY MIDGET D C Electric Motor It's a boney! Looks and runs just like a big one. Molor is powerful yet measures only 1 x 1 x 1 1 inches, weight one outsel Turns up to 4 100 r p.m. a. REVERSES instantly Motor is in durable black plastic housing Comes complete with two 1 2 volt batteries in clip bolder transparent plastic gearbox—PIUS ten extra gears and pulleys for working out your own ratios. No shocks sparks or shorts. And no trans-



Runs on Ordinary Flashlight Batterees!





former is needed. Endless hours of lun Educational Money back guaran ce.

Send to many Deder man only \$2.90 plus p. Laured. Or send \$2.00 we will line too tame & to

IMPERIAL SALES CO., Dept. A-006 114 East 47 Street New York 17, N. Y.



Kimberlite Gems

the world's newest precious stone



SEND FOR FREE ILLUSTRATED BOOKLET

A miracle of modern science as described in recent issues of Seturday Evening Post and Readers Digest, A magnificent new precious gem whose fire and brilliance cannot be approached by any other gem on earth. Dessling Kimberlite rivals the diamond in beauty but stones of equal size are 1/30th the cost (\$24 a carst unset-tax incl). Send today for free illustrated booklet telling this thrilling story and describing pine, earrings and ladies' and men's ringe. Write Dept. P.S.-10.

KIMBERLITE GEM CO., REO BANK, N. J.

HERE'S A REAL MONEY MAKER FOR YOUR HOME WORKSHOP



WILDS. CUTS SOLDERS CHARGES BATTERIES

ORDER YOUR WELDER NOW

FIR out and mail to THE LINCOLN ELECTRIC COMPANY Dept. 205 Cleveland 1, QNie

"LINCWELDER 60"

New Lincoln Arc Wolder

Cash in on these Profitable Jobs!

He the handyman welder for your neighborhood. Repair damaged car bodies and fenders. hx toys and gurden tools . . . braze and solder broken parts . . recharge batteries.

- · Simple to install ... operates from 115 volt grounded circuit. No.12 wire lesed for 20 amps.)
- Approved by Underwriters Laboratories.
- Comes complete with full instructions.

Bhip me the "Linewelder 60" with accomories \$48.00 (Including heatshield electrodes, cartings, electrode holder, ground clamp and cable). Battery Charging Attachment \$10.00 extra. Enclosed in [] check [] money order Send me free bulletin on the new "Linewelder 60"	
Name	,
Address	J
CityStatesid	ŀ

300 Power Import

Triple revulving. CUPPIN holds 10th 200 and 300 power lenses. No frills. just executent optical qualities delicate adjustment solid construction. Its quality and price estounded biology astructors A Vetime bargain for students schools abs research amateurs Aspate can now see one! Performance cannot be duplicated for \$ 5.00)

FEATURES: Fine micro admissment adjustable plano substage mirror. Docetall hardwood case threaded free If you are not amused at its quality send it back in 10 days

money retunded mmediately fend check, cash or M O for \$14.05 ppd



set of Twelve Sw as pattern tipe Sheffield steel For the work Regularly 28 93 Alt different Special 23 03 per est postpaid

Free catalog Money back quarantee.

AKRON ARMY-HAVY STORES Los Angeles 27, Calif.



DANCE \$100

smart dances from the most maders to the I page and the imper charges from the most maderia to the old feverties at home in private without teacher most or partner to any revens charge on the local teaching and many others are to ong a motion one i made electron of the course of \$1.00 and the second of the course of \$1.00 feet so is the second of paths for \$1.00 km paths of the path in the course of \$1.00 feet so is the second of paths for \$1.00 km paths of \$1.00

Superior professional tapa, both men and heets \$1.00 pra-setd or \$ 0.15 play shipping charges. State pipe, large or

ROLLDEX, P. O. Box 45, Dept. D-85, Nuntington Stu., N. Y.



HATS LIKE A 22 RIFLE-KRIS RABBITS SQUIRRELS Powerful silent occurate For hunting, torget, routing peeks. Specialization of لها جوب الراجم

HUNTING SLINGSHOT

Heavy duty 7° osh stock 40 steel balls, extra rubber target GUARANTEED at declars, or send \$1.25 to Whom-0 Mtg. Co. Box 88 South Pasadena, Calif. Professional medal of Net'l Slingshet Asen. Extra steel ball ammunition, 786 for 300



SAMPLES FOR TRIAL Hurry postrard will do. WHO HE BUNET- had pror Author KRISTER PRODUCTS CO., Dood 708, Akron S, Dide





Washable! Re-usable! Indestructible!

I will show you how to make \$200 or more per week . . . with just 13 words! Write at once for FREE sample of amazing new signs and letters that every store-owner needs and wants. Stick one on his

window . . . customers walk in . . . you collect cash on the spot! Yes, it's that simple! Amazing new scientific "miracle material" makes sales easy, profits pour in. Only a limited number of kits on hand, so act fast. Write to me, Jim Frank, at once.

CLAYTER CORPORATION, 65 West 39th St., N.Y.C., Dept. PS-10

ONEY Be an ART Trained Artists are Casable of Earning Enroll Naw! FREE BOOK, "Art for Pleasure and Profit," fully describes course, instruction acryica, and commercial You can take at home in your spare t me the west known WSA opportunities for you TWO ART OUTFITS and other fea-WAS COMMERCIAL ART DE-SCONING, CARTOONING All in tures included with training. Ask for New Triol Plan. ONE complete course No previous MAIL COUPON TODAY * NO SALESMEN WILL CALL Art experience necessary we teach you aren by step Prenare for a fuscinal ng bodoy or profitable career WASHINGTON SCHOOL OF ART Good art jobs swait artists to advertising to es aton, publishing Studio 1310A, Washington S, D. C. For 37 years WSA graduates have been took og good. WHY NOT YOU! Please send me full information and your Free Book, "Art for Pleasure and Profit. (Please print). Low cool-stay tarms, Street Cltr . 2one State ☐ I am interested in your new Trial Encollment Plan.

TECHNICIANS



GAPS IN INDUSTRY MUST BE FILLED BY MEN TRAINED TO HIGH STANDARDS . .

The man who really has the "know-how" will win the best rank and position and the highest pay.

"Engineering Opportunities" lists many specialized home study courses written by world authorities in Aeronautical, Civil, Mechanical, Muning, Petroleum, Structural, Electrical, Radio, Television and Plastics, etc. Send today for your free copy of "Engineering Opportunities" to Canadian Institute of Science and Technology Limited, 326 Century Building, 417, 5th Street, N.W., Washington D.C.

Conadian Institute of Science & Technology Limited, 526 Century Building, 412,5th Street, N.W., Washington, D.C.

P wase forward free of cost or obligation of any kind your 130 page handbook, "ENGINEERING OFPORTUNITIES".

Nome

NGINEERING OPPORTUNITIES

Address

Course Interested In

Age

Canadian enquiries . 263 Adelaide St. W., Torente I



Clean and Mothproof Rugs and Upholstery

Can you qualify? , . . If you are dependable, bonest and willing to work, send for FREE Sookiet explaining how you can become "your own boar" in a growing business of your own. You it use proven successful methods of established DURACLEAN Desires. Service rendered "in the baue," offices and public buildings. Easy to learn. No experience necessary.

DURACLEAN cleans by absorption No scrubbing No souking or shrinkage. Pabrics dry in just a few hours. Dut grease and many uneightly spots vanish as if by magic colors revive. Uphplatery and floor coverings last longer

DURAPROOF kills maths and carpet beetles, Makes material resistant to both' Another year 'round service, DURAPROOF, to our knowledge, to the only moth proof service backed by a National Money Back, 6 YEAR WARRANTY of protection. Also rendered "In the Home," at your customer's convenience,

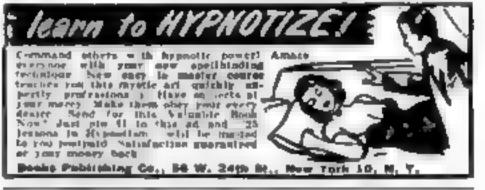
These services are Nationally Advertised' Leading furniture and department stores recommend DURACLEAN Dealer's service Almost every building in your territory bouses a potential enstoner. Even auto dealers buy your service to revive upholatery in used cars. You get many voluntary and repeat orders.

Some deniers establish a shop or an office after business has grown. Others continue to operate from their own home. Profits up to \$15 for a day's service on EACH of your service mea. Territories are limited! Write now for PREE Bookiet explaining details of these Nationally Advertised services.

Puraciean Co., 1-180 Duroclean Sidg., Deerfield, III.









Buy U. S. Savings Bonds

Fix It Yourself

Save yourself a lot of expense by doing your own odd repair jobs. Get this new addition of a famous book, showing with diagrams and directions, how to fix and repair furniture, electric outlets, windows, doors, leaky pipes, floor boards, chimneys, boilers, weather proofing, painting and hundreds of other construction and repair jobs. Picture diagrams show how each job is done. Full cloth bound de luxe edition only \$1.49.

POPULAR SCIENCE MONTHLY, DEPT. 1051 353 POURTH AVE. NEW YORK 10, N. Y.

TEST YOUR OWN RADIO AND TELEVISION TUBES AT HOME!!!



CONDUCTANCE

TUBE TESTER

No knowledge of tubes necessary = 100% accurate for direct shorts, opens, burned out tubes.

Buy it—Try it—If not satished, return in 5 days— Money cheerfully refunded.

\$398

SEND NO MONEY-ORDER COD., or send check, cash or money order & we pay postage

E-Z TESTER CO. (Dept. P.S.) Macon, Ga.

FALSE TEETH

ELUTCH forms a comfort enshion; holds dental plates so much firmer and snugger that one can eat and talk with greater comfort and security; in many cases almost as well as with actural tests. Klutch lessens the constant fear of a dropping, rocking, chafing plate, the and too at druggists. . . . If your druggist hear't it, den't waste meany on ambetitates, but send un lôc and we will mail you a generous trial box.

KLUTCH CO., Box S194-J, ELMIRA, N. Y.



CASH IN YOUR SPARE TIME

YOU CAN MAKE UP TO \$40 A DAY sharpening and setting circular saws for factories, builders lumber yards -- with NEW BELRAW COMPLETE CIRCULAR SAW BHUP, LOW COST, Sharpens 4 to 5 saws per hour, so experience needed, complete instructions, Send today for FREE Catalog,

BELSAW MACHINERY CO

4484 Floid Bidg. Kenses City 2. Mo.

"Radio For The Millions" shows:— HOW TO BUILD 78 RADIOS— PHONOGRAPHS—OTHER SETS!

The giant book, Radio For The Millions tells you how to build 78 radios and phonographs! Imagine! 192 pages, 648 pictures on building an 8-tube FM set, a 2-way radio station, bicycle radio, floor lamp set, vest pocket portable, midget AC-DC set, superhet, high-fidelity amplifier, all-wave receiver, home recorder, etc. Plus full details on "trouble-shooting" and handsome cabinet suggestions! So order now—send no money! When book arrives, pay postman only \$1.98 plus postal charges for handsome Deluxe edition. If after 7 days' free trial you aren't delighted, return it for full refund. Mail your order right away to:—

POPULAR SCIENCE, Dept. 1051, 353 4th Ave., N. Y. 10, N. Y.

BARGAINS AMERICAS Leading BINOCULAR RETAILER

Outdoor Life editor wrote after testing 2 pair UNITED HINGCU-LARS: "The Vest Pocket 7 Power is surprisingly good amasing in fact the 7 x 25 is a fine binacular for all general requirements and your 12 x 50 a remarkable grass, etc."



anabh bew. Qualtyglasses Arbromatic fens Have prerecen ground aptics, lightweight metal hodes. Molarups-Dunt proofed

Easy to Hold Easy to Focus

The ultimate in a fine binocular Tremendous power Fuetherweight weight only 24 or) Precision made in every detail COATED, providing sharper, brighter images. Individual focus. Objective lens is 50mm (2 in | across)

10 x 30 \$39.50

6×30-\$27.95 8×30-\$32.50

COATEO for charger charger (mages There I super FEATH-ERWEIGHT glosses We shouly in to 18 out es such Each measures a compact 4 y 2 8 5 Day to power and brice do they differ Fach offers an excellent



WEIGHB 17 OZI

7 = 35

An all purpose binocular Gives exceptionall starp orthitant images, biointure Bustproofed Individually focusing eye pieces. Also auto \$54.80, HAME MINIST, IN CENTER focus with individually facusing eight eye piece 7x86—\$49.56; 7x40—\$52.50; 8x40—\$62.50,

15 to 46

\$30.75

COATED

COATES

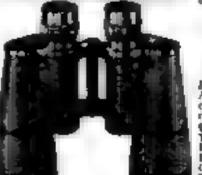
Whitenak to eacher linear forces of 13x 20x, 5tm and 15x etc Turn pourse tube to click no ruesawork Telescope measures 9° closed 27° when extended wright only 18 on 1 Mas rue proof chrome tubes inter 4 built objective irre Al. 12 optic striaces are COATED for 22 instict holes clearly at 5th feet (see also for astronomical observation.



POWER BINOCULAR \$16.95

Also 7 Power \$21.95

coarrol Pocket sine Weigh only 4 os and 7 on respectively! Field of 370 flat I 400 year. Precis on constructed Pilish binoculars. Not Fig 2 Glasses. Nade of light-weight durable clack chrome metal. Achromatic Carry the UNITED seal of



7 x 50 \$39.50

8x40-\$48.80 10x50-\$62.00 12x50-\$68.00

Powerful perciason made gineses.
Achrematic tens. Individual eye focustom Superb glasses of quality
construction

UNCOMOITIONALLY QUARAM-TERD Try For 20 Pays At Our Right If not fully satisfied return for full pefond? Cash orders rushed postpaid On (O D 's locitude \$2 M deposit Add Federa, lax Priers purpose perside les r case and strapt.

UNITED BINOCULAR COMPANY

9043 S. Western Ave., Dept. ARF-4816, Chicago 20, IR. Octoby Salesroom open Mon. Thru Fri. 9:00 AM -2 30 PM



VETERANS GET SPECIAL PREFERENCE Railway Postal Clerks City Mall Carriers City Postoffice Clerks Stenographers-Typists Liquor Inspectors Messangers, Etc.

32-Page Book on Civil Service FREE.

Mail Coupen teday — SURE

FRANKLIN INSTITUTE

(Not Government Controlled)

Dept. A-80 Rochester 4, N. Y.

Rush to me, entirely free of charge, 32 page book with (1 A full description of U. S. Government jobs; (2, A list of 1 S Government jobs; (8) Tell me how to qual-ity for a job.

Name	 MMI 10

Street

City

NEW BIG RADIO CATALOG

Ready now! Complete with everything in radio, TV and electronics. Newest parts as well as old, standard lines. Paste coupon on penny postcard and mail today!

ruette Radio

DIV: RADIO WIRE TELEVISION, INC.

NEW YORK 13 100 S ath Avenue NEWARK 2 Manual 34 Central Avenue BOSTON 10 I10 Federal Street BRONX 58. 542 E. Fordhom Road

30 YEARS OF VALUES

ı.

-4

	LAFAYETTE RADIO, Dept. Ki- 100 Sixth Avenue, New York Please rush Free catalog	13
PASTE	Name.	14
ON P.	Address	
POSTCARD	City State	

Fistula May Often **Result From Piles**

FREE BOOK - Gives Facts On Associated Ailments



A new illustrated 40-page book on Fistura Rectal Abscess. Piles and other rectal and colon disorders is now FREE to all sufferers. Write today-a card will do. Thoroton & Minor Hospital, Suite 1849, 811 E. Linwood, Kansas City J. Mo-



12 Months Driving for \$4.95

A new tire guarantee with each tire. Pasitively Not Re-Cops—Every Tire Machine Impected

400-16 \$4.95 Two for \$9.50 650-16 \$5.50 670-15 \$5.95 700-15 \$5.95

Bend this ad with order. Mail orders rushed on recould of theck or maney under for the size dealed

West Park Tire Sales, 14018 Beech Ave., Cleveland, O.



TAKE orders for old, reliable line theet quality druce and sport starts. All styles fabrica...colors...sises. Sensational LOW PRICES, No experience needed FREE Sumples of actual fabrics and big Style Fit waiting for you Bend no money but was more NOW! BOSTONIAN MTS. CO., 29MickfordSt Dupt N. 41 Boston30, Mass



make your own Gems 7950 All necessary impidary equipment is furnished, including a super-charged diamond blade for sawing, and all wheels for grinding, shaping and polishing sho com-

plete instructions. The complete equipment as shown, less motor and belt, for only \$29.50.

Lo.b. Burlington, Wisconsin, Write today for information and literature.

ILI MANUFACTURING CO. Burlington, Will Dept. M.

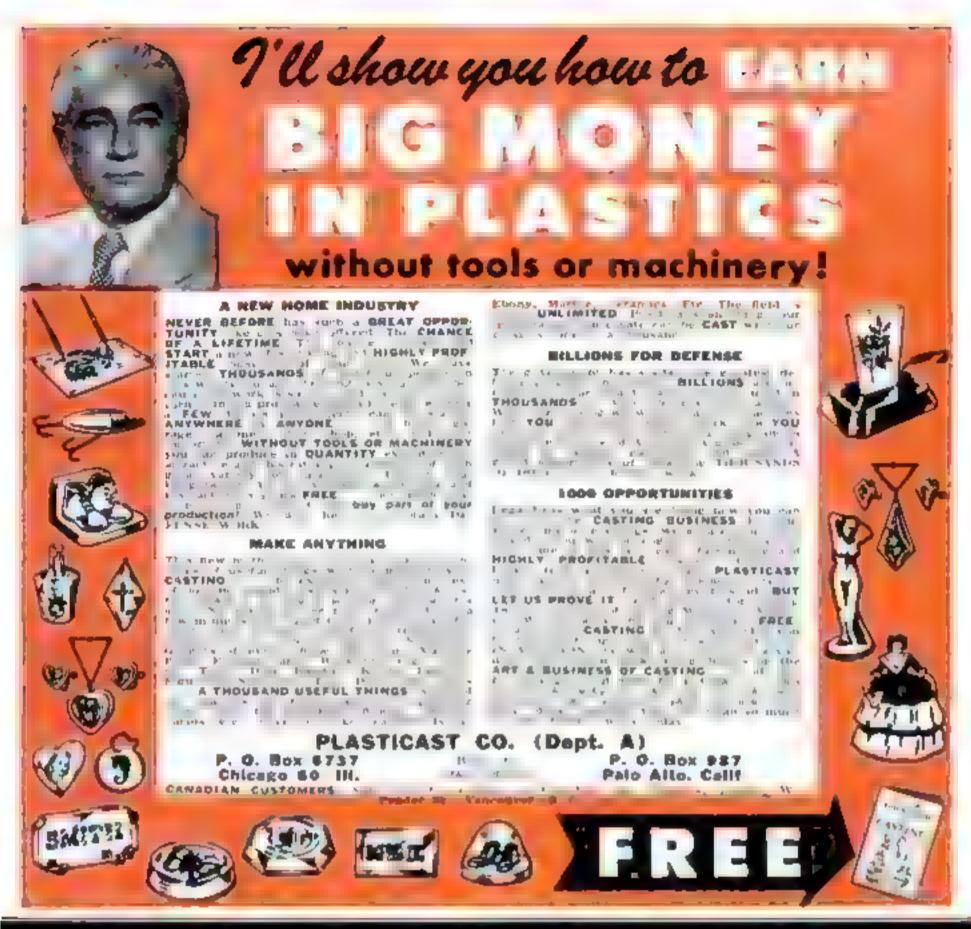


A worldwide product needed by every home, business and farm...priced to sell quickly! Automatic Red Comet goes into action as soon as fire starts... smothers fire without human aid. It's a sales 'natural'

FREE SALES KIT Patter units have erause etc.
d you FRFF Handson's centre.
Tried and present it will make bode sende: bust examin. At T

d stock Write for detacle, Inday! COMET, INC.

Dept. 24.A. N. C. Bidg., Littliten, Colo.



WAR SURPLUS INSTRUMENTS—RADIO—CAMERAS



ELGIN-WALTHAM-BULOYA

Waterproof shockproof Type A-11 back watch 16 J black face whate numerols 8weep second hand Used by AAF Built to exact specifications of U.S. Govt. Genuine War Surplus, State first and second choice as limited quantity available. \$19.75 ONLY Add \$1.95 Federal Tax



MINIMATURE COMPRESSOR

2 piston air compressor operated by V series wound motor Can be used AC or DC Equipped with dual therms cutoff for mutor and compressor Positive regulator 2 to 15 PSI Popul safety valve Usable as vacuum or pressure pump Ideal for lowe ors. dent six air brush work and agrating fish ponds \$10.95 WOM



DESK MICROPHONE

A preclaion buist microphone. usable for intercom, P.A. systems, sound pro-Jectore etc . ONLY



MAGNESYN INDICATOR

For remote indicating compass Automotic direction finder Calibrated from 0 to 360 da-

Gevt. Cost \$90.00

Now \$3.75



confrost #1

7" X 125' Aero enforgingcontrast # |

\$1.95 roll 16 mm. X 50' Magazine-Super X, developing included.

16 mm X 100' Super X-negative

\$1.50 WAr egralus-outsisted but Guaranteed. Send your inquiries for World's Largest Selection of Surplus Aerial Comera and Radio Test Equipment.

5730



SOUND POWERED PHONE

No batteries needed. Tour voice generates current. U. M. for 25 777 ea Perfect intercom for shop, office. farm, darkroom. WAR SURPLUS Orig Govt. Cost \$58.00 88- \$10.95 NOW



KOLLSMAN ALTIMETER

For auto or airplane. Used, gueranteed Accurate, Govt. cost \$168 QD. \$10.95 WOM



HEAD PHONES

specification Read Covt. Used but guaran-Sets. teed 51.59 ONLY

All merchandise guaranteed. Order these Surplus Bargoins Today 20 % Deposit on C.O.D.'s Minimum Order \$2.00.

SUPPLIUS Dept P-111



WILSHIRE BLVD.,

OCTOBER 1951 65

NOW YOU CAN AUTO BODIES Like an Expert!



Here is "know-how" that saver year \$5\$5 an:

wheel alignment suspension woodwork ng metal working welding frame repair epholstering flalshing and much more!

Get this brand-new, COMPLETE handbook for sure-fire working knowledge of auto body and fender repair. COV-ERS ALL MODELS AND MAKES OF CARS Tells you how to do profession-ally-perfect Jobs on, straightening a fender brace, hood section repair, fender-hood alignment, front-and alignment, toe-in checking and adjustment, rear springs and mountings, aligning bumpers, swayed and sagged frames. top section repairs, hardware wheels and tires. lights and wiring AND MUCH MORE Simple down to earth language gives you step by step direc-tions. Hundreds of cut away photos and diagrams make each procedure crystal clear. Packed with latest dollarsaving short-cuts plus proven techniques for top-notch workmansh.p. This handbook oun SAVE YOU HUNDREDS OF DOLLARS in repair bills

Head In month Dail cupon to get Butern Auto Body & Fender Repair Jor Fender Repair Jo FRFS 10 day val.

Prentice-Hall Inc., Dept. M-PS-1051 70 Fifth Ave., New York 11, N. Y.

Send me for 10 DAYS' TRIAL, "Modern Auto Body and Pender Repair " I will either return it in ten days and pay nothing-or keep it and send only \$1 00 down ; plus postage) and then \$2 monthly for 2 months.

Name.	17		1011				71	- 11	
A inten-									
City				Marte					
BAYE!	Rend 13	WITH	Titte	r OL PON	end	Ħψ	pay		- 5

Learn this



IN 90 DAYS AT HOME

Money-Making Career Open to Men and Women, 18 to 60

Hundreds of me a 1 women between S and 40 make \$10 to \$20 in a single May no me inc such Mussage and Mydro Therapa There by a man from borcors pospitals same for the and the fire heates earn arge f if the incomes from these or 1 pro ate gra er or n r own offices Others make good manny from bonce treath dre give in a are time Leave the to teres i g more il ali ng profess on 10 he r own home through our

harte. Saine attractors as an our nationally known res lint billion. You can wen todeper home and prepare for future security by a face for your Dipiotes. Course can be manufell in 3 to 4 months, Many cars while the learn. Begin just training at once



32-PAGE BOOKLET FREE

b I is at chopon below tplease print have and a otto a) and mal it for your Fills, ropy of 32have lift must in Hookie. If you at at many we Will it use knaton's Char's and Success Blooklet or or a sent one of orthogon page should but e to be a sent morage paid

HE COLLEGE OF SWEDISH MASSAGE Dept. 170M 41 E. Pearson St., Chicago 11, Illinois

Please send me PREE and postpaid New 32 Page Illustrated Hooklet, Anatom, Charts and Success Booklet at once

Name		
Addres	H	
Cltz		



NEW LOW PRICES GUARANTEE

Buy direct from manufac-turer and savat Kit comes fully wired tostailed in a pitty Pis all machines! You get all these new marie! 6 Motor & Brecke! 6 AC-DC 115v 50c 6 Multi-speed foot copere! 6 Cord set & block 6 Lasy instructions 6 Ecest pulley & bolt 1 WLITE gives with hit.

FREE, jog \$2.95 Chrome SEWLITE given with hit, TO DAY PREE TRIAL -- GROEN NOW!

And so moser pay COD or send groney order and we'll pay postage Please state whether wheel on your machine turns toward you or away from you Shipping we diba.

SENIOR SEWING MACHINE CO. I Avenue Dept PS-30 Brooklyn S. N. V

TREASURE HUNTERS—PROSPECTORS SELECTIVE METAL & MINERAL DETECTOR

A highly sensitive detector of revolutionary new design, Readily distinguishes metals from black sands, etc. Ideal for finding placer deposits. Write for free literature.

GARDINER ELECTRONICS CO., Dopt. PS

2010 N. Dayton

Phoonix, Arizona



Destruct room Wearst Transport
Wede for free bookiet and price helt

INDEPENDENT IRON WORKS 2416 E. 23rd. Street, Dapt. C. Lui Ango es 58. Culcf.



Ends front wheel drag on 4-wheel drive willys Station Wagons, Pick-ups and Joseph Bates gas up to 5 m les per gallon the wear front as an increase and power Stope shalling front wheels case out of gent's wheel drive tandies purforms cambe the 2 wheel lastel up terms of William to more ups Polished alone num goar anteed husbicheck Milliam C.D. Write for circular WARN MFG, CO., - Dept. S, 1625 3rd Ave., Seattle 1, Wash

TRIC MOTOR BARGAINS! 15 HP 1750 SPM 1975

1/4 HP 1750 RFM 3200 3450 3900 1£ HP 352 4751 Every Motor Fully Guaranteed

Heaty but the arm of bullet on and Cabar' or Taples 11 to Note a cycle Stay offers bhase Standard Makes C. F. Wagner Le aghouse etc. 1 Bush our old c TODAY to see atc. 1 A 1 plane 12-y. direct current bargains. Prices (.e. b. land Brettinghouse ROBERTS ELECTRIC CO., 849 W. Grand, Dept. 12, Chicago.



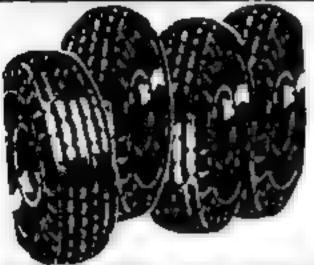
Try VACUTEX

Blackhoad-Remover

The amusingly effective Vacutes extracts Blackbeads automatically - WITHOUT aqueering the skin or enjuring theory. I may to use with three fingers. It reaches Blackheads anywhere Try it 10 days and if not delighted, return VACUTEX and your dollar will be refunded

BALLED PRODUCTS CO., Popt. 103 19 West 44th St., N. Y. III. N. Y. Enclosed find #1 Send postpard Send C.O.D. I will pay postman II plus postage; \$1 refrand if and delighted SORRY, NO C. R. H.'s DUTSIDE Y. S. A

TUBE GIVEN WITH EVERY TIRE AT NO EXTRA COST



TEE SENT WITH EVERYTHE YOU BUT

PLEASE MOTE Our Tires are MOT Re-Treaded or Re Crepoed

GOOD USED TIRES

TIRE WILL COM-

TURE CIVEN WITH EACH PASSENGER A TRUCK TIRE AT NO EXTRA COST EEND THIS AD

If year size to not listed write for prices. 18 YEARS AT THIS ADDRESS.

5011 42 70011 642 74011 7 9 10

Thousands of lires shipped sit aver to 6 A. All tires shipped F O B. Phile. Send Check or M.O., with this ed. Dept. S.

STANDARD 434 N. Broad St., Philadelphia 30, Pa.

TRADE MAGAZINES TO SUCCESS

Get latest copies through our Easy-To-Get Acquainted Service, Nearly 1200 business, professional, construction health, motel, oil, travel, mail order, hobby, music, pets, photography, plastics, sports, television, selling, agricultural and others covering all interests. Send for LIST today, It's FREE.

COMMERCIAL ENGRAVING PUBLISHING CO.

344E North Ritter Ave. Indiana

BUILDING

BLOCKS Eaty to start your own prof.

Spend, Igw cost Concrete Vibrator Block Mechine produces 1000 blocks in E-huar day All bites and shapes. Complete details FREE Mail \$1 fee won derful book. Now to Build Your Own Concrete Block Hume.



No Endorsers

ITALIAN ACCORDIONS



All types, all models, Vary best. Hand Made, Fully guaranteed, Buy direct from Factory representative at lowest wholesale prices, and Save Money Also Button Accordions. Chromatic Accordions and Concertians, We take any instruments in trade. Send name and Address for FREE catalog.

ITALIAN ACCORDION MFG. CO.

7600 Cottage Grove Ave., Dept. F5-10, Chicago 19

Borrow 50 to 5300 BY MAIL

Need meacy? No may ter where you we you can borrow MY MASL, \$50,00 is \$500.00 like any quick confidential way his an dorsers weeded. Employed men and wemen of good character of gibts. Soirs room maney problems quickly and in conspirts prince; with a loan made by mail. Employer, relatives and friends will not know you re applying for a loan. Convenient monthly payments. Rush coapondising occupation for Application Blank sent. Fig. 10 plain envelops. There's no abligation.

Convenient monthly payments. Rush coapecgiving occupation. For Application Blank sent. PART in plain envelops. There's no shiftgation. STATE FMANCE CD., 210 State Finance Bidg. Dept. D. 13 DES MOINES S. 10WA STATE FINANCE CO., Dept. D-13

STATE FINANCE CO	., D4Ft, D-11
210 State Finance Bide	Day Maines II, lows
	EE Application Blank.
P.12	

NAME.
ADDRESS.

Occupation STATE



\$200 GROSS IN MY FIRST WEEK!

in a business of my own

 Would you like to own a year-round business in which it is possible to make

\$200 gross the first week, as did L. A Engles? R. E. Traynor says, "I made \$62 gross in one day" Others report gross from \$100 a

day to \$12,000 per year

Surely you want to investigate a golden oppor-tunity like this No special skill or expensence needed. You can start without a large investment . . , and -if ambitious, honest and courtoous you can succeed and make good money year after year.

No shup necessary. Our Electric Rug Washer cleans rugs and carpets like new right on floor . . . quickly removes durt, grace and restores natural color and beauty So offiment and safe for carpets, used by

largest hotem and railroads No risk Machines fully paranteed. Mail coupon for full information including how to make big profits fast in YOUR own business. BIG opportunity.

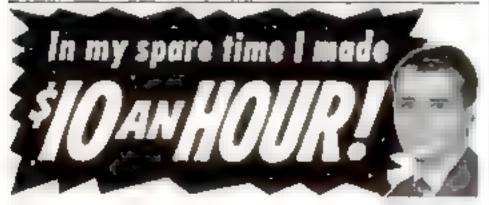


... MAIL TODAY!

YON SCHRADER MFG. CO. N11PL, Racine, Wis.

Send at once (no obligation) FREE booklet containing information about your Electric Rug Washer and how I can own a permanent, profitable business

None	_	
Address		
en.	 Para.	



H SADLER That's what Hugh Sadler earned showing Science's New Midget Miracle, the Presto Fire Extinguisher

Make good money, full or spare time! Folks "go for" this tiny "PRESTO" in big way! About the size of a flashlight-yet ends fire as fast as 3 seconds. Secret is new wonder chemical, specified by U.S. Air Force for fighting fires in B-29's.

Science's New Midgel Miracle-"PRESTO"

Guaranteed 20 years! Sells for only \$3.981 Show it to civil defense workers, owners of homes, cars, bonts, farms, etc., and to stores for re-sale -make good income. H. J. Kerr made \$20 day. C. Kama, \$1,000 month. Write for FREE Sales Kit. No obligation. MERLITE INDUSTRIES, Inc., Dept. 1110, 201 East 16th Street, New York 3, N. Y. IN CANADA: Mopa Co., Ltd., 371 Dowd St., Montreal 1, P. Q. (If you want a regular Presto to use as a demonstrator send \$2.50. Money back if you wish.)

REALISTIC IMPORTED MINIATURES



Shooting Tank

Wind it up and away it goes on subbor caterpollar troad shoet og flery sparks Metal with furret 3% Postpa d.

Fortross Gun

Shoots projection in a randistle but harmiess way. Can be can operated tos. All matal, supera mounting, 21/5" high, Postpaid.

Sond 10c, coin or stamps, for our new calploque

J. J. ANTHONY . Box 402 . Milwaukee, Wis.





including GOYA NUDE plus FREE Stomp Callecting Sook

Spain's heat setuitional stame Dis a led to this imported on leg-I on of 523 different managed stamps from Josens of hard to get countries. Also included, FREE book which shows how to fiter (by stamps Reau at it on raine yet ALL yours for only 254 with Burgain



Send 25¢ today, Ask for Lot EH-2

ZENITH CO., 95 Nassau St., New York 38, N. Y.

Powerful Midget Motor

Or vee Tuo s. Medets, Hacers, Boats Tra ng. Care Retained Toys, Turntables Fushers May no Signs Music Boats, Meter se Equip-May no Signs Music do your work!

Runs Up to 6000 Rev. Por Min.-Lifts 50 Lbs.

Fig. 1 is mostly by lider, yet in hundreds of useful at a So lie weight (using goat two see below yet to Id. great two sees become get to total the gha cutte 3 or lattigating to consider the great the grea

onder How Money Sock ? Not Joon Salveled. \$1.98

Variable Speed Gear Box-30 to 6000 r.p.m.



Dut complete set commong Suiter Power Midner Motor and Variable Speed-Power Gear But, Use together or separately. Multiplies nower 200 times to uff up to 50 Bm. Variable speeds from 30 r p.m. to 8000 rpm, Gear & pulley drive, han book \$2.00 I week motor & gent how complete set \$3.98 Johnson Smith Do., Dep. 425, Detroit 7, Mich.

- WAR SURPLUS OPTICAL BARGAINS

35 POWER ERECTING MICROSCOPE Amening c-acity 'A L-Position 'I inversal mount 3" of working appeal from object to platform Prism Erectors give you an erect image exactly as your eye aces it Ramaden Eyepirco permits the precision fucuating it imment c for corrected dispective 1" dismeter Microscope body is of brase with block crack e finish 515 to 5100 Mg. 570-W 525-30 Passale SLIDE PROJECTOR SEPA, Compute of all was to make the following size projectors:

the time there

CIMIT

EDMUND SCIENTIFIC CORP., BARRINGTON, N. J.

KIDNEYS MUST REMOVE

Nagging backache, loss of pep and energy, headsches and distincts may be due to slowdown of kidney function. Doctors say good kidney function is very important to good health. When some everyday condition, such as stress and atrain, causes this important function to slow down, many folks suffer nagging backache- feel miserable. Minor bladder trritations due to cold or wrong diet may cause metting up nights or frequent passages.

Don't neglect your klineys if these conditions bother you. Try Donn's Piles a mile discretic. Used successfully by millons for over 50 years. It's amaxing how many times Doan's give happy relief from these discemforts—help the 15 miles of kidney tubes and filters flushout waste thet Doan's Pills today



WE TEACH:

How to Report

Washing Machines Vacuum Cleaners Electine Ronges Lomps, Maters,

REFRIGERATION and

kens, utc.,

House Wiring At Home In Your Spore Time!

For a man handy with tools, and happiest when working with his hands, OPPOR-TUNITY as Wide Open Today in this great and growing field. Everyone is a customer for the man trained to service electric appliances

Open Your Own Shop,

harpra their Host Counse lenches vot thus business from A to Z preparing you to take a well pend lub or gent are said deep You can actually start in your basement or garage with the finds were and you to fine the arm g

· Include An ELECTRICAL APPUANCE TESTER A big KH of Tools ALTER OWNER COST

MAIL THIS COUPON for FREE BOOK

H. T.	ARMST	reong	
PACI	FIC TI	LAINING	SCHOOLS

7217 So. Broadway, Dept 3-5110 Los Angeles 2, Calif. Dear Sire Picase send me, without obligation, your free bookist and complete details.

__ Zene___Stole

AGIC-SCREEN INCOME PLAN OFFERS BIG MONEY, AT HOME, SPARE OR FULL TIME Reproduce any painting, design, trade-mark, picture, printing, in full color, on any surface! Proven new method en-

ables you to cash in on established business where Profits up to \$5.00 or more an hour are being made, right note! Examine complete Plan and equipment without risk!

Write today for free sample - Complete free details' Sond NOW!

CALIF, ACADEMY OF SCREEN PROCESS Dept. 110 5100 SO. VERMONT AVE., LOS ANGELES 37, CALIF.



Dept. 23

2605 Elmhurst, Detroit 6, Mich.

NEW DISCOVERY HIDES DEAFNESS

CHICAGO (Special)—An amazing new electronic ear which miraculously hides deafness and transmits even whispers with startling clarity, has been revealed by a noted Chicago electronic scientist.

He disclosed that this new discovery enables the deaf to hear without any button showing in the ear.

To acquaint the hard of hearing readers of this magazine with this new electronic ear, full details will be sent in a plain wrapper to anyone who requests it. Address: Electronic Research Director, 1450 W. 19th St., 320-D Beltone Building, Chicago 8, Ill. A penny postcard will do.



IDEAL LAWNMOWER SHARPENER

Seves work, saves time, heips you earn extra domars Sharp-- and, power mowers at disassemb ing slete shop in one ne equipped with kmile Grinder and d, ping in Recond.nor Home owners E. C.ubs. cemeteries good money for eifior sharpening; get ar shared

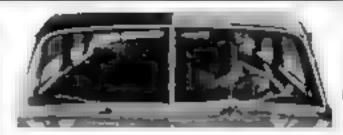
WRITE NOW FOR FREE CATALOG FATE-ROOT-HEATH (O., Dept 1-4, Plymouth, Ohio

When Writing to Advertisers Please Mention Popular Science



SQUEEZE-ME" Windshield Washer

AT LAST a low priced windsheld washed Operates by some a sent of a partic bell a Washes both right and left windshe as at same time Fits at care and truck. To the course tests after No holes to drill Rolls shough we are for a washes to an a set to queed as a catent dispersion to discuss to de and show Operates as effect in the present to discuss to the property of the property of



DENTON HASSELL Mfg. & Distributing Co., 734



NAMES AND ADDRESS OF THE OWNER, WHEN THE OWNER

8MM & 16MM HOME MOVIES

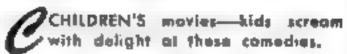
. at NEW LOW PRICES!

50 Ft. 8MM MOVIES FOR ONLY

100 Ft. 16MM SOUND MOVIES

*ADULT FILMS—for sophisticated grown-up audiences that like a little spice in their movies.

FAMILY pictures—thrilling reels for the entire family to enjoy.



FREE Club Membership

If you want to receive your films on approval—with the right to screen them in your own home before you decide whether or not you want to buy them-lose our club-MEMBERSHIP IS FREE!

*ADULT FILMS

Feature Hollywood's most gorgeous girls in exotic song and dance routines.

_	LONG	Coupen	on I	Launh	LOSE	cora -
	OF-T	HE-MO	NT	H CL	LIR	Dept.

MOVIE 6507 DE LONGPRE AVENUE, HOLLYWOOD 28, CALIFORNIA Rush following C.O.D. | 4 8mm films for only \$4.99 3 16mm SOUND FILMS at \$9,99 on MONEY-BACK GUARANTEE, 1 PREFER 🗆 A 🗍 B 🗀 C

Please excell me as a member of the MOVIE of the MONTH Club and send me a real approximately every month postpoid-ON APPROVAE If I like the reels I will send my remittance within 5 days (enclosing 25t) without obligation. I

may concei my membership	at any none.
NAME	Age
ADDRESS	Zona
CHTY	STATE
	to persons over 21 years of one





Dataina GEIGER COUNTERS - TREASURE

LOW COST BATTERIES . LIGHT WEIGHT . 3-WAY SIGNAL . GTD 1-YEAR

Detectron GEIGER COUNTERS

electron co =

Sensational new madels; low cost operation, light weight, sensitive to all uranium minera's. We have 4 models-one in YOUR price range

Detectron TREASURE DETECTORS

Lightweight, periable, sensitive Model 711 |right) is most powerful mode. New model 27 for nuggels, rings, Also minerolights. ampli objects.

Write Today for Free Descriptive Ellerature 5631 CAHUENGA, NORTH HOLLYWOOD, CALIF





Wide selection helps you choose most becoming styles: at reasonable prices,



Now buy latest, most popular creations in modern reading-magnifying glasses from the oldest established U S. firm offering this service! Thousands of customers

coust to coast! We furnish 14lens sample card with many combinations1

as low

30 DAYS TRIALI



SEND	FOR	
FREI	cat	alog
PRE		alog

LATES? **577K**E

NAME. ..

DEPT SP-10

SPECTACLE CO., INC. \$37 S. Dearborn Street, Chicago 5, 111,

AIRCRAFT COCKPIT LAMP ASSEMBLY



6 ft. extension rubber-coated cord, with ratchet locking speal device. A C. or D.C. surrent from

Price \$3.50 & to 110 Volts. tdeal for home or car use



POCKET-PACK PRECISION WRENCHES

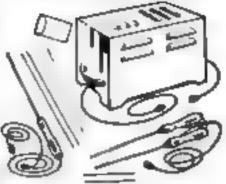
First quality chrome-molybdenum steel, heat freated, hardened, Branched to close telerances. Open end and twelve point box for double was and volve. NEW-camplete with plastic care -\$1.75 go. complete, POST-PAID IN U.S.A.

WAR SURPLUS BARGAINS

LOW VOLTAGE CIRCUIT TESTER

Made for U.S. Ordnonce Deal. to rigid specifications. Pertable stone hand corryson unit is a so !contained trouble shooting device for making a complete and rapid check of the generator, buttery circuit, one uding may circuit and vortuge regulators. Satiety voltage, regulators, cut-out settings and generator performance can be marily determined. A turrific testion unit for gornges, mechanics, fruck fleet awners, boot and marine mechanics. Can be used an any è or 12 voit system. Govt cost oppres \$175 00. NEW -- com plete with book of instructions \$32.50, Shipping weight 20 lbs.





PORTABLE WELDER

Will wold, braze, solder and cut of metals up to 3/16" No apperience needed, full instructions included, Plus Into eny 110 Volt A.C. or D.C. Icne. Complete with electrode and corban holders, ample supply of electrodes, corbons, flux and all seconsury components. Connot be duplicated for many times its price. NEW-pr ce \$14.95



All New. Prectional & numbered. One. Vel. \$15. Nationally known brand Astd. sizes, Sel 30 \$3,50

EXTENSION DRILLS High Speed Steel, like new. Asst at sizes from No. 36 to 40. Lavigitia from 6" to 12. Appresimptely \$20 value.

Set of 17 \$3.75

SOCKET-PACK



Chrome-plated alloy steel, heat treated, breached to cluse forerunces Reversible catchet handle, with sciewdriver bit on reverse side by It-in spring-looded hell retoiser en both handle end extention. Clear top plastic kit, 10 place set - NEW complete - \$3.75. POSTPAID in U S A

GENERATOR



Direct current ganerators for welders, plating, fruck and marine use, D.C. appliances, etc Asteroff quality, heavy duty, Rating 200 amps - 28 volts or 2500 R P M Govt cost \$300 00 Weight 70 lbs NEW - \$21 50

U.S. NAVY HEAT MASK ASSEMBLY Safety helmet.



liber welder s foce shield bib and snood of high resistant asbestos, treated with flome proof restn Govt EDIT \$50 00

WET PLATE BATTERY



Extra long life, rerhorgeable, ideal for partable radios. mobile enits, etc. 2 V 20 Amps Only 5" bigh Visible ball float hydrometer built in Lucitu. Shipped dry COOR

Used singly or in multiples Ship-NEW \$1.95 ping wt. 3 1/2 lbs



Each can generates enough heat to cook from 3 to & meals. 12 cans to the case -6 ea. 2 ez. end 6 ea. 4 ez. NEW-@ \$1.50

"WRAPLOCK" KITS:



Moke your own clamps to lit ony tile hote tubing atc Kill contains

ratchet to take up slock, enough steel band and yokes for 100 ar more jobs. New Weight 4 Lbs. \$1 Each complete

"BALTIC" SWEDISH TOOLMAKERS VERNIER CALIPER

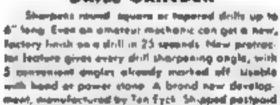


ULTRA PRECISION DAT # 001 graduation: Quick accordestagetts, childs and survide mequipments. fine engineering. Extra honey rule hand-limed shaing head indiside play Bockwell C 60, topped measuring

host-used and recommended by most critical experiments and research machinists at Lackhood . Daugles - Sondin - GM - BCA -General Electric, Save 50%. A 537-50 value - only \$49-25 - inerter case seel. Also a standard grade Meuser Design Caliper 1 mode in Germany 1 for the graduction machinest, Q.6" at thousenoths, the most accurate coloper at this type we the market, thousands of satisfied users - only \$12.95 - teather case included

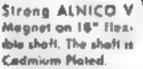
These are both guaranteed buys. Your manay back of not untirely survived. Order newl

DRILL GRINDER





Strong ALNICO V



FLEXIBLE SHAFT MAGNET

For picking up coffer pins, nuts, wrenches, etc., from inaccessible places. Removes Bobbie Pins, etc., from drains, Erfehme Magnetism Guatunter Highly polished magnet and handle.

\$1.70 postpdid



Universal type, case hardened tips. Set of dies will need up any brazier or round head rivet from his to his With adapters for air pus or hand use. All new .. cost Government about \$27.00 Complete 15 pleca set, wt , 2 lbs., \$5.00

MITRE HAND "It pays its way in just one day!"

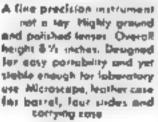


If a sensitional Filew HAND MilkE sovies hundreds of hours requires only a "Rick" of the hand for a precision mitte every time. The HAND MITTE will cut any deured angle. Its rugged construction will handle hard and salt wood mouldegs, plastic trim, base shoe. taminated materials, rubber untropous, utc Mede el heavy gauge stoinless steel

\$3.95 postpaid Sand short, remay arries to such. 73%, deposit required to C.O.D. gagars, AR prices P.D.B. Calver City. California, saless scheroise stepsed,

Send 15c for New FPSF Illustrated Catalog. AIRBORNE SALES CO., INC. ENEVER THE CALL

MICROSCOPE 100 and 150 POWER



\$7.93 peripoid.

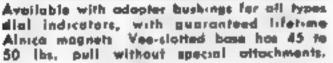


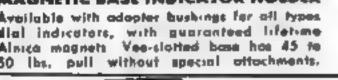
K-VISE SAFETY LOCE WARNCH

Her I for tested non-clip grip, cod-plated A flip of the finger releases a 1 ton pressure, 10 inch sixo, Price \$2.50

\$3.50

MAGNETIC BASE INDICATOR HOLDER





LECENTRAL TUBULAR MICROMETER

Zero to one inch. Mode for U.S. Air Force: Measures circumferences and cylindrical wall thicknesses. Case hardened tips NEW-\$5.50 Each-complete with adjustable spanner wrench,

Classified Ads only 80c per word per insertion, poyable in advance. Minimum ad 10 words. To be included in December issue, copy should be in our office by October 23.
No conceilerious accepted after October 15.

OPPORTUNITES:

AUTOMOBILES & MIDGET CARS

CLYMER Books—New Titles Cutalog All 1951 U & Cars pholographs spec 5-cations technical data compares all makes in one book \$2.00 Catalog all 1951 British Motorcyc es \$2.00—Catalog all 1951 British Motorcyc es \$2.00—Repr nt latest Direction Book \$1.50 The Modern t hassis \$2.00 Sports Car Engine \$1.50 New York to Paris 1908 Race Book \$1.50—1951 Indianant is Official Yearbook \$1.50 Soun ag the Stock Engine \$2.00 British Car Owners Handbook of Maintenance \$2.00 Specials and Hot Rods \$1.50 All Postpaid Catalog 75 Motorbooks Free. B. Clymer, 1268 B. Alvarado, Los Angeles 6. Calif.

WATER Injects in A so Economy -Power Methods Free disstrated information, Neher Industries La Verne 6, Calif.

CATERPILLAR Junior Crawler Tractor - Electric Power Driven Licensed by Cater, for Tractor Company Freet practical child a vehicle in America Rossed Pull-Track for driving over lawns fields of hard surfaces Junior modes of Caterpillar D 4 Diese) Junior modes of Caterpillar D 4 Diese) Junior and in Caterpillar D 5 Diese) Junior 10 to 10

BIOGERT Speed Equipment Catalog 'in wirid' Save order direct M. ymood Mufflers \$4.95 Dun Mufflers \$4.95 Cut Outs 26.95 Dun Intake Mantin do \$12.95 Racting Came \$25 Hi Compression Heads \$16.95 Water Intercors \$6.95 Customizting K to \$1.96 Ch. ims Access ries at discussed—25c. Almquist Engineering Mijfin d 422 Penna (Denlers Wanted)

get agricult accurration op to 100, power and miseage increases from any carl Famous Soup-Up Book shows how to build Speed Equipment. Recers, Fast Convergions, Stock Cars, California Roadsters! Carers Soupling Speed Luning Nacing Tricks Fig. Formulas Economy Information Indianapous Methods. Customizing

Al care' 300 Photographs' Drawings' Heaving Plans' Complete with Hot Rod Buy ders Book \$1.50 A mquist Engineering M ford 41Z Penna

BUY racing heads dual manifolds Hot colls, ate without money Information free, Newhouse Automotive Industries, Los Angeres 22

HERE It Is? The buy of a lifetime for any Car Owner. Dealer or Mechanici Automobile Engineering." a huge, 6volume set totaling 2.504 pages, compiled by 1) oremost automotive engineers published by a lamous pub taker and covering s phases of car deagh operation servphotos diagrams charts this entrial (-- h cyclo sedia of car know edge stands half a innt wide on your bookshe fill will be yout us mate as hor ty on coulches brakes put to access sel systems wiring disgrams 100; souther his as plus a other parts in all leads of mode a This immetian torume tressury of money saving fac a retain at \$24.00 a set. By sported publisher & agreement Popu ar Science can offer you the same set at fantastic bargain price of oner 80 88 Just a few sets available to act at once Rush on y 10 94 for the best buy in books ever Popular Science Month y Dept (05)-C 353-4th Avenue New York 10 M Y

SAVE California Custom Accessories headquarters Buy direct from origina, designers Chrome dash panels electric push button door trunk conversions fender skirts dual muffers lowering kits speed dress up equipment 40 page cata of Hundreds of photos—like Eastern Auto 1918D Bouth Orand, Los Angeles 7 Calif

MOTORISTS—Save gas with preven automatic alcohol water injector. Only 85 85; Free literature Vaporiter Company Box 7033M. Los Angeles 27 California.

NEWHOUSE makes another sectational offer See page 46 Don't miss it

MAKE Pord use Diesel fuel \$1.00 for plans. Refiner Box 292 Columbus Nebr

FOR as little as \$6.00 you can put your as here in the December issue Get in on the Chr stmaa may order rush and deliver your sales to be detected the 1892 100 re deri of Popu as Science Special classification. Cr resimas Offic analysis for this issue Same as a rate you as always paid soc a word. The December issue cases on October 25th Write today for order bunk and issue book at Him To Make Money Out of Classified Advertising. O K Kelly. Classified Advertising. Manager Popular Science Monthly Dept. B. 151 Pourth Avenue New York 10 New York.

AUTO SI PPLIES A EQUIPMENT

NEW and used guaranteed work for civilian and Army care and trucks, Largest stock in America. Mail orders, Pioneer Auto Wrecking Company has W 13th Avenue Il-wer Colorado

PROM Speedway to Roadway Track or and he award heads manifolds to we awar able or any passenger on its speed at the secondary getaway have a steel out make it weeds at 42 5-P Diversey Chicago 30

Short Pains Outli a contect to a outless No table or shop required Pres par ticulars. Outmetal Co., Avenua & Decasur Illinois

POR free descriptive literature on alcobol nater disection for care trucks tractors write Shade Weinter New York

OPT Not de largest Auto Accessors & Paris Catalog and save mises Over 50 000 stress including Hally and Accessors tes. H. Accessors and accessors of it is early and a paris and accessors to fire a catalog at trues we have mat Had In the part Jam packed with barge a Completely on faced Send 250 its date. J. C. W. S. et 1919 T. Access (Chicag as

Inches tee a Auro Supply Tucson Aris INCREASE Outsine on-ease three to five muse as less improved vapor ser in creases power entier starts g 43 50 each Tu b O Vage Box 1187 Stockton, Calif

HI SPIFII equipment accessories free

Kitti it puts babbitt type bearings on the pistons for 100 000 miles. For \$3.00 postpaid Lachapelle's treatment. Ferns Products, \$120-D Walnut Drive, Los Angeles 2, Culti, (Data on request.)

MOTORIST save gasoline by Vacu-mating overrich mixtures. Fits all cars. For Free particulars write Vacumatic, Dept. 1797. Wauwatosa Wisconsin.

CRASHPROOF your car Rusco Airplane Safety Belta how available for passenger-car intariation Russe Manufacturing Company P O But 1001 Middletoub Conn

FREE Catalog accessities Ar Horna Send postcard Bul Met anna 148-A East 40th New York 16

CHEVROLET owners replace your own converting rids in one hour save & New tous price \$2.65 H & Harman Tool Works Vernor Mich gan

SEND for free Life Membership Card. Water Burners" of America. La Verne.

WILL buy a Stanley Steamer engine 4x5 or 4 x612 H ward Cyphers R. 1. Box 313 Central Point Ore

MOTORISTS—Restore motor comprestion save burned oil donaits with engineered product Only \$3.85 Pres folder Advanced Engineering Box 7813F Lan Angeles 37 Caufornia REVOLUTIONARY method, developed for jet engines easily locates fatigue cracks, other defects, in genra, pistons castries or meta's Garage Weiding Machinests K t \$4 Distributors wanted Mut-L Chek Hawthorne Caril

SUR Visor for your car only \$1 25 See ad on Py 87 Young Products 2604 Eimhurst Detroit 5 Mich

RACING as Hot Rod Equipment at Nation a Lowest Prices. Prec Power Handbook a h Catalog Dic Almquist Engineering M ford 45Z Penna (Deniers Warned)

HOW to buy speed equipment without money Ho se i.g Information free. Newhouse Automotive Industries, Lee Auge es 12

K? Y case and live gauge combination reta. : \$1.05 Discounts to salesmen, draiers send \$1.06 for sample Box 3692 Lakewood 7 Ohio

FOR as little as \$6.00 you can put your ad here in the December tame Get in on the Christmas ma order rush and deliver your sales to a direct to the 1 992 000 readers of Piguiar Bolence Special reasification Children's Gits area able for this issue Same low rate you've a ways paid sole a wild. The December takes closes on October 15th Write today for order blank and free booklet. How To Make Money Out of Chassed Advertising. O. K. Kely. Chambed Advertising Dept. B. 353 Fourth Avenue. New York 10 New York.

AUTO TRAILERS

Bt 11.11 your own trader Parts for all kinds. Disstrated catalog 10c, Jim Dands 125-8 Wannat Wisconsin

MOTORCYCLES, BICYCLES AND SUPPLIES

RECON ITIONED motoreveles and motors (he man access the Comprise stock Indian parts, Expert rebuilding Past service, Indian Motorcycle Saies Kansas City I Mo

M.DORT Car \$10. Motorbike \$7 Satetytyce \$15 cess engines. Whitzer motor \$4, Sin the motoraheet \$10. Evintude outboard may \$8. Pour a clane type tires \$3 (mailorder only). Send 25r for new catalogue Number 4) just out listing these and hundreds of other bargains in new and used maget cars, motorscooters homebuilders parts plans engines transmissions was surplus, etc. (350 by Pirst Class Mail.) Midget Motors Directory Athens, O.

CLYMFR Motorevele Books Catalogue all 1951 British Motoreveles with photo-graphs and specifications \$2.00. The Motorevele Bervice Manual all U.S. Makes Questions Answers \$2.00. How to Obtain Speed \$1.50. All Postpaid Catalogue Th Motorbooks free E. Clymer 1268 S. Alva ado. Les Angeles S. Casil

MOI PREY (1 E. Miggarine Worldwide Coverage, Yearly Subscription \$2.00, Sample 20c, Motorcycle News, 8424-B Sawyer Chicago 25

WHITTER all attachments \$20 Cush-man in terseaser \$20 It dan mutercycle \$30 etsanes \$3 up motorbike frame \$3 Rish 24 350 frest class mails for catalog \$40 is ing may other amazing bargated in maters in deet core motorseasers motorbikes etc Associated Bux 1764-CS. Tuedo Ohio

WHIZZER in Behwinn bike \$30 good molaracouter (twist \$190) \$22.50 midselect \$11 Shaw (across motor \$15 Serid \$350 (lac first class mail) for catalog \$15 jammed with other sensations, bargains in wheels motors chatches motorscoolers in dget cure motorsettes motorskup, etc Gas. \$38 Eric Toredo Ohio

REBUILT Caseline Engines \$17.00 to \$27.00 Caume: Motor Industries. Temperance Michigan

AVIATION

PREE 168 page It ustrated catalogue of Bylavion products Cumpiets bouded was ehouse stocks write AMC Supply, P O Box 1440-8. Fort Worth, Texas.

MELICOPTER, build from spare parts or kit. Cataing and blueprints \$5 00. No model. Aero-Tech, \$61 Jefferson Street Montgomery Asshema.

BULLET Raceplana, Homebuilt, Speedy Monoplane. Bineprints 32 00. Corberatt.

PROPELLEHR plans supplies for snow pleate no busis Calason 30c Barks-Markell Bux 2101Q Pt Worth Yeass Markell Bur 31010 Pt

FIGHTPLANES Practical Design Bue-print form \$2 0 Thompson Asternit But 644 Princer Wash of on

RURCTRICAL SUPPLIES & EQUIPMENT

LAMPS -build own Originals, Parts Wholesale any amounts Catalogue for Brown Lamp Co., No 501 Wellston, 81 Louis 13 Miles

LAMPS Had trouble finding repair parts? Your search is ended, 25c hoings 64 page illustrated catalog containing wiring charts Gyro Lamps, \$462h Clark Chicago 44 I 'Invite

WELDING, SOLDERING

A C. Welders 4 Bizes. Lowest Prices Proc literature, Heigerson's Bervice, Cabton Kansus.

MACHINERY, TOM, AUPPLIEN, ETC.

FRFE Cataing Full the hobby and light Industrial power wood with a tools Ountained Dealers wanted Backus Machine to Co. Chappews Fairs Wisconsin

NEWS For the shape using Policy Priers, Write for particulars, Studick Sife Co. New Usm. Minnesota

BIG Doring Value -- Five Assorted Listings screwdvivers Amber Hand,es, Shock proof Pastory surplus, Stocks limited, Worth tripps, \$1.00 postpaid, Sax-on, Dept, N-4.3840 Pullerton Chicago 47

POWER tools, equipment wholesale prices, Free Bulletin, Homecrafters Coequipment wholesale operative, Orand Rupids 4, Michigan

TIGER Tractor America a Pinest & HP riding tractor. Pulls 4 tons, 16 inch plow -- All his tractor features. Pres literature Tiger Tractor, 78 East 84, Meyers W to

CIRCLE Cut Attachment-for 14" delta -eut circle and out tangent-65 08 post-paid, A. W. Gibbons 3633 Chelton Road Shaker Heathia 30 Ohm

MACHINE Shop Men and Handy Men! Bave over 50 a on the most authoritative est of home-fastruction books ever pub-

The Modern Shop Practice Library The famous publishers issued this magnilteent 4-Volume set for which thousands eagerly paid \$34 50! Now Popular Science makes the very same library yours for only \$11 M1 Contains world's most complete coverage of machine shop knowledge, Over 4 000 pages of vital information tailed idustrations, plus 287 tables! Written simply, clearly by 41 of nation's top ranking experts. All you need to know about tool making, pattern making foundry work hip & mechanica drawing howshi is Each ship worth the price of the set alone Fact column indexed Mean for Melime bindings. Hever before in L 2 thatery has the e been such a need for the characters the machine shep men. You can make those morey by commise Your complete. It is Modern Stop Practice Library. 14 (b. Modern St.op. money back of not fully deschied Remember you paynot the \$34 or paid by thereands of beliefied men but the law price of just \$1 50 Read remistance and order Juday to Dept. 1051 C Para at Science 253 sub Ave New York 10, N T.

SPECIALS!! Send \$1.00 for full value Credit Certificate and receive monthly eata og mat tig Hardwate Power Toria. Paint Supplés Save deligte Many Leme priced less than wholesale Satisfaction guaranteed' American Hardwale 413 North I was M. brapelle 5 Marc

ENGINES, MOTORS, ETC.

WINDING Data Hating 225 motors, single and three phase, \$1 00, Motor Data, Max 7611. Kanass City 2 Me

HOTTEST surplus list in the country E'ectron ten Hadran en Afreralt Gadgete Dick Ross. Everett, Washington

REBUTI T Cambine Engines \$17.00 to \$7.00 Cambel Motor Industrian Temper-

MOTOR Winders free butleting Winding and tretting resipment Motor Indus-

EARN Big Money! Become an expert in Direct Engineering. Think of it, you can now claim The Complete Diesel Engineerthe Library through a special Popular Science offer that knocks off 67 of the of the ben be for this may been 6 Vocame bet the most complete thracy of its a nd You get it for only 56 66. Over 50 Diesel experis and top-ranking technicians pooled their high-paid knowledge and experience to create the world a most exhaustive library on Diesel sugmeering. Here's your complete treasury of fact and illustration on the Construction. Operation and Manytenance of Heavy Duty and Migh Speed Diese, Engines. You get al. a. led matrue tion in amount my easy to follow style practice mathematics saids rule principles of meet to it construction operation and maintenance of motors. Diese, specific pionts mechanical and electrics, equipme it for Diesel Incumentation therm idnamics theory and design of Direct engines and a great dear more Profusely to un'race of foremed with tables char a show now distrains Each to und sturdily bound for a deved Blart of the read to higher to total Today Cath your Diese Emering I were T war tem t not \$10 mg but only 10 50 to Dept, 1831. Popular Science 351-4th Avenue New York 10 N Y

11 BOATS, OUTBOARD MOTORS

STEERING Wheels, windshield bracee's from 44.04 Modern Clones Wares Skia." at lewest prices, Complete pre-cut paywood boath. Earganth galore. Folder 10c Marine Bot 661 Mendora Minnessia.

PASTEST Boats In The World-Ruid Now Complete plans available for sleek Three Point Rueing Rydrop'snes. Runabout and others Send 250 now for new Instruced catalogue Champion Boats Box 901s Dept 2) J Long Beach Calif

NEW used, rebuilt marine motors Marine conversions, fittings, Pres Catslor Stokes Marine Supply, Dept. 22, Cold-Water Mich

FULL size but to shape best parterns busy that 7 38 'ced lightered R. 3 38 feet Erastrated a Rout catalog 25c (er n). H o to B of the Box to book 2, 00 C eveland Brat H eprint Co. Dept. A-77 Clereland 11. Ohio

OUTBOARD Motor Farts- New-Used for all makes, Bend stamp for price enotation, Outboard Molor MAIN THE 300D ATTACK Ave. Boston 10 Mass.

SAVE 2/3 cost, Assemble your own boat We furnish parts. No experience necessary Rowbeats Crusers Presided Catalog 2.5 M.Awest B at Company, Menomonee Falls 1 Wilconsin

MARINE conversions for Ford and Jeen ! engines Catalog 10c Lehman Manufar turing Co., 8724 Bread \$1, Secure 2 N. J.

13 BODY-01 H DING 401 HSES. JIL JITNE & ATHLESIC **EQUIPMENT**

DEADLY Jude - Piercest fighting techalone Trick knock-sats (Over sec alus-tra ed pictures) Expert instructions -Three vocames Cox, etc 422, Variety | Mouse, Box 46-A Wall Station New York 5.

EXERCISE With Piet To Plet, Punch O Bag 1817 5, 86 Ct. Cicero Illinois.

SUPER Jiu Jites Course Two mammoth volution New oregular 44 86) for us -C Catada

HARMELLS Dumbbel v Exercise equipment, Courses. Free booklet, Good Barbell Co Reading Petitia

HANDBALANCING self-taught. Learn television stunts, Write, Power, \$23 W Vine Kalamazoo, Michigan

FIELD GLASSES, TELEMENTER

PREE Catalogue Thousand war surplus optical bargains London Prisms Taleoc den if mark etc berd \$4.00 for 10 Lens Robbetst Set and Project buck at O Jargers \$3.00 05th Avenue Onune Park 14 16 E

RECORR and better telescope gits with metal parts direct from manufacturer r on Bo r th Fren P stucks Bij Wooden Ave H moden New Jeroey

GIANT, 160 power astronomical telescope with 6 ft, tripod (16,000 area magnification) Clear Vision full power quaranteed \$15.00 F O. B. factory National Science Services, Dept. TC, Reserved M Y

BAVE 50% On New Minorulars Pres Catalog Free bunk How to Beleet Bin-oco are Write codey Rushings 6, 42-P36 Careen Panadena | Castigin a

WAR Surpose Bargat to Ma orulare Taycoccipios Santanum M miss of Certago Princia Melacon Ejecuces Object tea eta Mail loc rot Big Catalog CN Bet 4 81 00 sur Brock CN 28- pages Lena Kit and ling Listinction Bounes Edmund Brien tive Corp (Former & Edmund Barrage Co.) Barrington New Jersey

BINOCULARS, telescopes microscopes, Our 20th year of suddenstin in o circle talent Bargain talang ree Brownscoon Co. 34 West 48th St., New York,

AMAZING prices, brand new provision http://dex. 2 0.000 up P 40 trial Po der Historical Penetral pricelal free Prentices of periods Bidg West Los At \$9.00 to Coul

FREE 20-page Binucular Catalog. Over on different models. United. Dept. ARP. 4714 2043 S. Western, Chicago 20

ONR 8" vetractor to escape with fit der-scape revolving exempers to 75 300 is not Kico Products \$11 Wy for Are. Hobotes, hen he ser

REPLECTING Telescopes, computely assembled 60X. \$25.90, Guaranteed Observatory courness. Pres intermation bayer see 4 2 2 is Avenue New York ...

ANTRONOMICAL Terescopes, binoculars. micr scopes, bought soid, repaired Books, such the seasmussen-Reace Amsterdam, N Y

B NOCLIAR Specialists at Brakes repaired Authorised Zesas Hemoodt dealer I e se Optica Salà Laurence Chicago 36 60 a 76 .4

BINOCT LARS comparely repaired. Send g assets on the Let untermine freid er in Service 26P Pracklin Ave Binghamilion. New horse

ALCMANIZED Telescope marries 3" f" diameters Lieuwees Prisms Tubing some Autro-Lincoln to encope year &in \$3.00 hore parket microscope \$1.00 Per card himgs p and 1 crature Propper Optical Co PH to But bury Penna

POWERFUL astronomical telescopes to a. love \$1.00 100x and 200x \$4.00. 10. 1 200x and 400x \$6.00 Full power Ceaf tit ift gaaran eed tr's miet int gibele 10c Bullegt beietige bernich Rein beud & Y.

POR as little as \$8.00 you can put your ad here in the December issue Oct in on the Christmas mail-order rush and dehver re un sairs will if rect to the 3 902 Jun 27. 4 ers of Publish Science Specia ciam ficatom Cr. states On to contact abording that made. Same fow take you've a maps paid. got a word. The December lasts turses on October 25th! Write today for order blank and free booklet. "How To Make Money Out of Classified Advertising." O. K. E. ly Classified Advertising Manager Popular Science Monthly Dept B 353 Pourth Avenue, New York 19. New York.

IS SPORTING GOODS, GUNS, FINALING TACKLE, ARCHERY, THAPPING

196 PROPUSELY Unstrated pages antique and modern pistois, swords, daggers armor etc. 50c Robert Abels, Pages Lex Ington Ave. New York 21

CAST from Molds—for making your own sinkers. Write for free illustrated bookset Reading Instrument Co., Box 75 Reading Pennsylvania.

LEARN Ounsmithing! Details, copy "Guns and Gunsmithing." 25c. Gunsmith's Service, 3115 Montress, Chicago 15, 10.

CALLE records, and decays for duck grow and guose butters. Proc calang Occar Quam 3140-30 Avenue Bouth Min-nearous Minn.

ANTIQUE Firearms, accessories and parts. Illustrated lists for year \$1 West. 100 Bouth Unio Street, Ariungton a Va.

AMMUNITION American Foreign and Obsolete New guns. Dime for list. Central Sports. Delphos 25. Ohio

5.000 BARGAINE, firearms, binoculars was retice catalog 50c Smith Museum Ruccomede N J

MOLDS For Schermen sinker squide lies and lures handled and housed nucl. Ity School Instances and house Shoots Molds Lucianaids New York Box 16)

SEND 10s for lists either rifles, handguns, shotguns, emmunition. Or send 25c for all lists, Frayseth s, Willmar, Minn.

AMMUNITION \$ Lager \$2.50 30.56 \$2.50 \$ Meaner \$1.50 Jap \$3.50 Iteram \$2.50 Send 100 complete list—100 kinds. Telescopes \$5.50. microscopes, rities, puttan crossbows. Ashten Company, 1511 Gardner Ho. 3 word 48 Canf

OVER 500 guns, modern, obsolete, List 100 cols, Ed Hows, M main, Coopers Mills Ma.no.

SPORTSMEN after the days bunt or when you're tired flabling do something you have always wanted to do. Do some prospecting My detailed builetin is strictly for the amazeur Contains nothing tech inical Money back guarantee. Send \$1.00 to James 21.4th Box 203-4, La Honda Cal

AT FRII 3N Hunters Farmers Shoot ers Over 100 excellent dest-variant rition from \$27.50. List \$ 25-Agramonts. Dept SM 201 Warburton Yorkers 2A, N T

200 CALINERS ammunition. New guns. Catalogue 25c Broper a He brook Araboca.

SCOPES, mounts guns, KV new \$42.00 All makes free dat, Ted Challingsworth Golden Calorado

17 DOGS, BINDS, NAMSTERS, & PETS

SEE Gulf Hamstery ad on Page 43.

EARN Up To \$400 Monthly Halong Amgorn of New Zonland Rabbits Piets y Star Lets Partice and free White a Rabbitzy Newark 35 Ob -

MAKE Big Money! Rame Chinchil's Rabbits Cash Merkets Supplied Write Today Rockh - Sarch Bettersville 18 Pa

NATURALIST'S Catalog 16c, Chameleon 50c, Hamsters \$2.75 pair Turtle 50c, Mexican Jumping Beans 25 for 75c. Quivira Specialities Topean to Kansas

RAINE Mink Pree bookset pen plans Inside secrets feed care hink are money makers Investigate today Lawrence Morgard Brigham City 13 Utah

RECORDING Pupe for hunting or man trailing. Waiter Bixler Peru Indiana.

THE New Panda Hamster write for price and details, Fred Bettershy, 436 M 4th St. Vinciand. New Jersey

RAIME Guines Pigs, Markets guaranteed Booklet free Taylors, B426B, Hapeville, Go

ST, Hernards, Newfoundlands, Grownpropose Persian K tien Stadios picuse Phone 2-1016 Michigan City, Ind. 28 3

HAMSTERS moneymakers, Send 06.00 for beautiful virgin pair, eage, and illustrated instructions, Proc prices, Dixie Hamstery 200 D Trinity Labe, Nashville 1, Tens.

LOVELY epides cream Grant Dane pappess Loving companion, --Guard 36 West jat No St. Sait Lake City, Utah

FROG RAISING

AVAILABLE for delivery Pamous Los Domesticated Builfrug breeders \$12.00 per per Yearings \$12.00 per dot POH Instructions on care & feeding of these frags Live delivery gustanteed Bend check or Money order Los s Prog Hatchery Box 34 Cat tab Springs Ca it

FARMS, OTHER REAL ENTATE

GOOD Faims Manches Washington Minnesota Minima idaho Oregon North Datota Dependable Crops Invertible of male Write for intalle in a describing top on farm opportunities Spectly which state J. W. Haw 136 Northern Facilic Ry. St. Paul J. Minnesota

OZARK Lands for all purposes Artual rive frontages & scree 500 00 and up unids bree jut unid b statute Mushard 424 M Mustenous Ave. Kanaas City I. Kan

B O Free Pall Catalog Farm and country real entare bargains good pictures many states cars terms that; ecupped businesses For Special Service state requirements desired location United Farm Agency 2825 Ph Main & Kansas City & Minhaert

NEW Farm & Business Cutalog Free! Just out! Maine to Florida . . Bargains from \$1 000 . . up! West's, S.G. Pittebush 1 Penna

PLORIDA Homesites—\$145. Pay ato monthly Large besutifully wooded Tracts high and dry in delightful Parama City Pleasure Resort Area World's finest Hearnes Lovey Lakes Beet flaring hinting Knjoy me every day in Una glorious a smale and desirable Community Law takes low building costs—low living costs make this ideal Pines for your Vacation Lodge or Retirement Home. You get Most ing Your money here, Booklet Pres. Douglan Wood. Box 873. Houston, Texas

STROUT'S New Pail Catalog fast out East and Mid-West Red ouver, West Coast edition Blue, Parme Homes, Statingson, hargains Eason Eithur Mailed Free Strout Res 19 215 238 6th Ave. New York 18 N Y

PLORIDA, New Lake County development adjoining Ocala National Forest Heat Sale from horeta. Nice hower tea 1741 at \$10 monthly Field or free Winters Vernor DeLand Florida.

Wall \$4000 Write Harn & Ashmurth

POLITRY & STPPLIKS

RAISE pheasants on the \$100 week plan Little capital and space can make you independent Prov details, Orest Central Oams Management System, Columbus 6 Kansaa

II PROFITABLE OCCUPATIONS

BE independent he secure have your own problems business—term \$20.00 and more a day making heautiful, fast-selling samps at home. No equipment needed Hillestrated course teaches you quickly Course parts calabid who teach price list only \$2. Ocason Co. Dept. 200 A10. 27 A. Drap, since thicago & U.

FREE book Won to Make Money With Home Workshop' describes amazing mathida and another by hondreds of successful crafts man from what to make M w to self workshop output spare time Write at orce for de and Remember it a free Crafts man also his Worth Mt. New York City

DETECTIVES Earn Big Money. Excelion apportunity Detective Particulars free Write Wagoner, P-125 West 86th New York 24

atom PROM haif sore growing Ginseng crop bought, Particulars 10c. Associated Growers, Sperling Manitola.

140 on WFEELY Made growing muchrecest. Presh Dried Dominion Patent 121 583 free apawn Borth American 1887 Youge Toronto Canada.

PRINT without a printing press his Product But page \$1. LEARN Watch-Clock Repairing at home, White its bing by fix al, untches for you. Insuite Modect Technical Supply Co. 55-Ph West 42 Street New York 15, N. Y.

PROF'TABLE spare time business operate home mating burgest full testructions for A ion 1 dustries 215-D Wright St. Shepherd Mich.

FINISH 6" maple saind howls for profit Sanded bowls at \$6 72 per dos. Lacquer 50s pint. Retail \$1.00 each Ottawa Woodcraft, Grand Haven Michigan.

WANT a Diese, Jon' Our subtorted upte-the minute Diesel Timb, a Fragram can help you eventy for steady buy per join at specialized military train he Covtel Diesel Tracsor Beavy E. instent Easy to master No limit of present to come Job Flacement Advance persice Jonesti gate We e for the mation below to terstate Training Service Dept. 2K Portter d. is Oven a

MUSHROOMS Grown, Boxes, barrels instructions 50c, Spawn 31 00 Manureless pures 52 00 Gordens, 336 Bannerman Witnespey Manutoba

ANIMAL Levers' Make money with animain. Send \$1.00 for details and instructions, 110 Practical ideas explained. Animai Lovers Ass'n., Box 8757, Tarsans, California

MONTY ment and fure raising rabbits. Pres particulars, Willard's, Canaga Park, California.

FREE Book '372 Unusual Worldwide businesses." Work Home (U.S.A.)! Pub-

13 BOOKS & MAGAZINES

MAGALINES bars dated foreign dometric arts. Broke broklets subscriptions, etc. Galatog 16s, (refunded) Cicerone's, 86-23 Marthers Blvd., Jackson Reserva N. Y.

MONIKHO TERRI Beares stratoul mitrel a true broke sup; sed Atlantic Book Service 2 Laurence Chartestonti 25 Mais

WANTED Thousands of used books to swap for ours W 'e for de'a) a Read a Book Eschatge 3822 Vilia Terrace San Ordo 4 La cornia

PRYCHIC Powers, Psychia Problems Superfaculties, three booklets totaling 227 pages for \$1.00 Jerdan 1130 Kener Avenor Louise to 12 Keptucky

POOKET STREE AT Publects Soud Wa & Jaher Book Service 436-E East 16 8 rest New York 57

HYPNOTISM simplified: Complete monelog instructions. "You Can Hypnotize \$1.00 Nephot am 1973 Dartmouth Avenue. Columbus J. Ohjo.

HARD To Find Books surptied Send

POCKET Book Swap* Send 12 books plus \$1.00 receive 12 different Jack Craft. R D *2. Delmar, Delaware

STRANGE Stories Sample and thistrated torature the Enchange Fitchburg 23 Mass

COMIC books—illustrated 20 Booklets, all different, \$1.00 Terry Thorns, Box 15535 Cremahaw Station, Dopt. PS-4, Lee Angeles S. California.

PiN Ups. Breathtaking Beautiest 40 Large photos \$1.25. Giant Edition 132 Photos in Plastic Portfolio 13.00 A must for all photo collectors, Special Gift with 13.00 order Rarepix Bas 11516, Los Angeles 48 California

JUMBO Humor Package—12 Dynamic Iljustrated Joke books only \$1.00 with Pascinating catalog Aladdin Book Co. 310-8 Pith Avenue New York 10

BACK date Magazinee, Specific incuse, pears Arken a Taranna 2 Calif

ADULT Broks -I ustrated Comic Pooktets 12 for \$1.00 M for \$2.00 All Different Prot gift with each \$2.00 order V M Rogers Dept PS Mos 14738 Cimerron Station Los Angeles 18 Cauli

ADULT book hargains, Send stamp, Valion, 63 Perry, New York 14, N.Y.

14. games à entertainment

ADULT povelties and, \$5.00 express. Tupler, 216 W. Jackson. Chicago

QUIZ-Bingo Ok-be Rommy Triple-Deal Madame-X Four complete games w h playing cards \$1.00 Postpaid, PO Bes \$142 Denver I, Colorado

LIVE sciton four miniature race horses actually run on track New exciting One Dollar \$318 Ridpath, Hollywood 46 Casti

MAGIC TRICKS. PIZZLES, ETC.

MACHEIANS Gambiers secrets exthing, Catalog 100 Book Co , Box \$71, St Louis 1 Ma

WE supply every noted magician Large Brulesson at catalog \$1.00 Holden s P230 Wrat 4... d S. set New York

VENIRILLO Professional Veice Thrower and Catalog 25c' Box 271-PS Philade phia

LATEST Magie for bocket, parior stage Catalogue 500 Tricks only 10c, Unequalled magic service for 30 years Douglas Magic land Deut 2 Daviss Texas

200 ELECTRIC stunts \$1 00, Cards \$1 00. Cutting Sons, Les Altos, Calif.

TEN assorted snappy Hollywood Ong Cards, \$1.00 Pun, 2548 Vermont, Los Angeles 44. Onlif.

VENTRILOQUIMM Taught. 26 stamp brings particulars, Smith, 501 Bigelow Peorla S I 1901

LUMINOUS Rubber Skutl black \$1 49 Becomes a se when worn Eat lath emoke Horrifying in dark or light, Johnson Smith, Dept. 423, Detroit 7, Mich.

FREE trick and large illustrated entaing -35c Lurro a Magas, 500 sout Street. Brooklyn a H Y

512-PAGE catalogue of 2500 tricks pocket parlor stage World a Pinest first 84 00 order) Kanter a 8-1311 Wai-But Philadelpins 7

BE a Magician Large professional magic catalog of latest tricks life, Iruiand, F-100 North Dearborn, Chicago

PLASTIC ventrinquist dummy with moving eyes and lips forther lone in thuded 25c Rosley, 26 West 38th Street,

MAGIC Package 50c Balancing Penny Twisto, the Magazian 316 Pine at MDe -Louis

PROPESSOR Owens card miracine Six easy to do ourd tricks. Be the life of the party Send one do at no statupa Pro-fessor Owens, Post Office Bux 313, Long Beach. California.

MADIC Most by Year 25c Sample and Mucie Culu state tree Magic Sixon Mateheaphda 2 M n

TRICKS Fundakets Nove her Speez-ing Punder Su prives Complete Selection (Sel A. detsen a M. 58 Ardmore Chicago 1)

COIN COLLECTING

PREE Foreign to., banknote and Con-Co. sectors II as rated the ages to approve approved Series Series Series In postage Tathem Coin Co. Springsets-USO. Mass

CART Profit and Pleasure in collecting aid coins, Send 10c for \$5-page illustrated coin catalog. You'll be delighted with it fiend for it now B. Max Michl. 37c Meh. Building Fort Worth, Texas, Largest rare coin establishment in U.S. Katablished

No bears OLD Money Wanted Will pay Fifty Dol-lars for nicket of 1812 with Liberty Read (not Buffalo) We pay cash premiums for all rare coins, Bend 4s for Large Coin Folder, May mean much profit to you. Numismatic Co. Dept. 30 Fort Worth Texas

\$10 00 EACH for certain Lincoln penniss. Indianheads \$59.09. Send dime for catalogue listing prices paid, Lincoln Coin Company Likhart 4 ir diaza.

1881-8 1851 UNCIRCULATED Dollars.

\$1 00 each, Willard, 5715 Kenmore, Chi-Caro 40.

FOREION coin burgains. List free, Lyle Andrews, Box 677 Summer Wash

POREIGN money two wooden nichels of "Coin Collector's" new magazine. 10c Lawrence Brothers, Anamosa, fowa,

Washington, Cleveland, Stone Mountain \$2.00 es. Blustrated Catalogue 25c. Norman Schultz, Salt Lake 9, Utah

SEAUTIFUL English Set (\$) 1959 Proof Coins in Special Box \$3 25 Giant Bargain Calalog 25c Behee a. 1100 East 43rd. Chicago 37, Illinois.

50 000 COINS medala bills lists free Nacy & P South and Phase 3 Penna

I OOK! Four Wh. man Fidees #1 00 Prior had 100 Blay a 100 Mathida Subhyrale. Calif.

DOLLAR Lots! Grab Baga' Bargains galore! List 10c. Fairway Company Rye. N Y

BARDAINS! Rare collections, 50 differout dates. United States large cents \$15 00 -13 different 83 00 48 different indianhead every \$6.00 30 different \$1.70. 30 assorted \$1.00 lackL evol \$2.00 is deres libertabead bickets \$2.00 d da es je pieces \$2.00 1800 had cent \$1.00 Complete High and Me this C taleaud 25c Worth coan Worth the control Corporation (D-412) Boston & Mass

OLD STAMPS WANTED

I WILL Pay \$100 00 each for 1834 ic green Franklin stamps rotary perforated eierem tup to \$1000 00 rach unused. Send 10c for Large thustrated folders showing Amazing prices paid for old stamps or na

RTAMP (OLLECTING

100 DIFFERENT, including Reservert trighgle Sc to approval applicants. S. Ava-lon Stamp Co., Springfield Mass.

AMAZING Offer 300 United States Mamps including commemoralities air-make high values to \$5.00—Only 10c to Approval App icants" (hustrated Surgain Lists free Mystic Stamp Co. Dept 44 Camden New York

COLUMBIANS Trans-Missessippi Pan-Americans Pan Pacific ten other differ-ent commemoratives All lige with your re-Sun 251-V C S A. New York &

WORLD'S Largest Stamp (74 x 14 inches) A real curiosity Setable for 50c only 3c to approved applicable Tatham Stamp Co. Springfield 56, Mass.

HOW To Recognize Rare Stam,e H 50 Vermont

WOW; 363 All Different Germany ide: Zeppelins. Semipostals Airmails High Values, etc to new customers, Jamestows, Stamp, Jamestown 506, New York

soe EXOTIC Japan Stamps-10c! Ken-more Richtord J-58. Vermont.

PREE-Complete sat of Pamous Americans. Flags. Parks and Presidentials to approves buyers. Send 3c for 15 of the above stamps plus full particulars. Triboro Stamp Company 146 Nassau Street Dept. 210 New York 38. F Y

FREE-Libetrated Catalogt Kenmore Richford C 58. Vermont,

730 FRANCE and colonies stamps loc Littleton Stamp Co. Littleton 26, N H

U S COLLECTORS—write today for free material Eagle Stamp Co., 2221-B

my a family for Only loc This mam stamps from strange countries estatory he up to 25c each A so approvate Maric FREE: Powerful Magnifying Ones

Jamestown Stamp Jamestown 267. N T EXCHANGE Stamps Universe Particu-lars free, "Exchangers" Bry 118, Sense France

71 DIFFERENT United States-25c, Apbruvals Utachts, 1143-A North Kener Chicago 31

300 DIFFERENT given free with approvals. Portage 30 Windsor Stamps, 1434 67th Piace Chicago 37

12 VALUE Greece pictorial set, Pres to approval buyers Pleasure Stamps, 1863A 32nd Street, Brooklyn 4, New York.

lote DIFFERENT Stamps given to apprival applicable brown he customers. Send it for particulars lists and appropriate Bitter Page 17-16. Roses and Ohio

DEALERS Wholesaid catalog. Postage 3c. Pra ksc : 5031 Queensbury Ba timure, Md "HOLY" triangle, "Orchid" dlamond niners ic 31 otners to Approvata Ka amazoo Frampa But 133-8 Katamazoo Mich

PREE World a oney O and Cardboard Triangie Approvals, Bouman North Miamt 10. Florida

3 GOLD-fillver Giant Triangles—3c. Approvais, Iroquals, Baltimore S. Md

POUND stamps containing thousands \$1 00 Lungacre Shop, 561 Sixth Ave., New York City II

FINE Approvata Past personal service What coul rise do you preter? I'd send their stamps Moson Skinner 436 Locust

BOOSEVELTS complete, plus 25 other U S., 10c with United States approves. Locust Box 105-A Harmon-on Hudson

PREMIUMS. Prined 20 approved Ot-St., New York City 38

EMPTY Spaces? Try my procted ap-plyvals 60, 76 - discount Numered 643 Eastern Parkway Brook yn 13 N Y

COLLECTION At A Standay, 1' Let us show you our top quality to to be approv-Rolers on appreciated Roseand Stamp Co Dept 8-D Spring Lake Mich

PREE Stamp Pinder." Tells instantly country is which any stamp belongs, 32 pages profusely idustrated Garceson Ca-BilliaM By tobi

PHEE with approvate commemorative short catalog 60c Stamp House, 1463 Dread Avenue Minni Beach 28, Florida

1 OOKING for Bargains? Try our 1 & 26 at prayage mounted in books of 1 000 We beneve in both quantity and quality Pirst try will satisfy, Clark, Box \$6402, Muskeron. Michigan.

Detroit Box 1010 Manchester, N. H.

so BRITISH Empire 10c approvals, Smith. Box 6618 Northeast Kansas City Mo. PREE! 50 Different Japanese stamps Apple vale Star Stamps 325 Wooded Jan estant 24. New York

FREE: 100 different China to new apprivat apple ants. C Mounthiow, 746 Mes ney Bris 1 54, New York.

\$1.00 AND \$2.00 Hong Kong contains 150) 50 Approvals, Free gifts Clairs s. 1602 Bay Parkway Brooklyn 4, New York

WORLDWIDE Pampe, 1000 ait different 6. 90 5000 \$13.30 Baigan lints from Beacift Baies Mappined 3 Mina

NO rarities, no junk, just good solid approvals for solid collectors. Dominion Stamp Company, Aritington, Va

FREE! "King Size" stamp of Japan Attractive approvals. Grey, 46 Lent, Poughkeepsie. New York

PEWNY Apprirate by country, M. H.

WE Give Away-Your Choice Latest Scotts Afbums, Catalogue and available these Worthwate Remarks When You Bur Prom Our Better Foreign Approvala Write Tiday Por Pu's Part mars Bent Witt Trial Approval Selection American Stamp Service Riverside Co.f.

SAN Marine Conection Pres 33 4:flerent Old and New Issues alima is com-memoral tes high to less casely Pres with approvad, Viking 136-PP C.inten St. Brooklyn New York

PRES very large Japan Plying Ocese Stamp, Approvals Included, Hathaway P.O. Box 211-8, Hempstead, New York.

FIFTY different Unried Blates poinmemoratives, dues, etc. All for 100, Ed Keiler Library 2, Penna

50 000 STAMP Grabuga 25c ouch Anderson 630a Bingaman, Reading Pa.

FREE ten beautiful Ceylon and Canada Pictorials with U S or British approvals Cables Stamp Studio, Soc 906 S, Coral Cables, Piorida

GOOD Packets build good solications. Write for Pres lists, Myers, Non 222, Lansdowns. Penns.

\$1 00. \$2 00. \$4 00. \$5 00 U. S. Given with approvaus. Southern Stamp Co., Box 79, Minmi Plorada

BARGAIN! 106 different United States Stamps including commemoratives air main 106 to approve, applicants Sunset Stamp Dept 24 Box 67 South Gate Cal

FIRST U S (1847) Government Reissues Sc 10c plus Otsot Bargain U S Con-ection only Sc to applica, is U S approvest Metropolitan, Non 1.2K Jackson Heights N Y

UNITED States stamps nearly 100 years aid. Mosevest set, others, 40c value—only 6c to applicants United States approvals, Wakonda, Box 272-H. Jackson Heights, N. Y.

POLAR Bear Triangle, Giant George Washington Six Colored Ecuador Arctic Triangle Stat American commemorative Corsics, Devils Island, others, Everything Iree With approved Capital Stamps, Little Rock 10, Ark,

DIFFERENT, 25 Canada, 25 U.S., 25 Switzerland All 36 Approvals, Alciale Marnard Mass

TAHMANIA Thatland first Victoria free with approvait A to Z Stampon, Box M Miams Beach 38 Fiorida

60 DIFFERENT D S. 16t, Ne Approvals. Geidenberg, 844, Appleton, Wis

JUMBO approvais. 1,000 different each selection Just le and 2c each Postage paid both ways, Stone, 45-5 Bromfield, Boston & Mass.

PILLIPPINES—28 different only 10c Colorful 2c approvais, Moffat, 921 Coilege Rock Hill 2, South Carolina,

U.S Price Last free. Petter Wetterquiet. 1635-13th Ave., Rockford Illinois.

WONDERFUL Offer 7 complete mint sets Manchakuo, Buhemia etc. only 10c, with approvals. Reich Stamp Co., 4647 Konmore, Chicago 40 III, Depl. 823

\$13 00 POR \$1 00! | 1 010 Different Stamps Cataloging \$33 00 Only \$1 00 Including Approvals. Stamper, 116-PS Nas-

307 ALL Different—Only 15c! Beautiful collection. Commemoratives, Triangles. High Values, Dicolored Stamps, etc. Carceson Ca. at 4.5 Maris

PENNY Approval Bargainal-Write Dept. PSM, 1267 Tutwiler, Memphis 7, Tenn

GOYA Nude-with approvals, 3c! Steams

COLLECTION of 500 Different just 25c Beginners De tail Lapprovate in cluded Niagara Bintop Company 24 Queer smay Niagara on the Lake Carinda.

PLAG Stamp-Pres with hygrade U. S. approvals, Weniggman's, 1933 Patterson, Chicago 13.

Nubbe Bet courts, approvais-10ct Attas 2830-p Elsenhower Racine, Will

At BUM Rolds 2000 stamps' Only 10c' Osamora Company, Manchester 1, Conn

LAUGH at Inflation; Thousands of fine stamps hast to be References brings ham pus book of 1000 Mingara Stamp Company 21 Quesnaway, Mingara-on the-Lake Can

JAMAICA Mint Coronation Set, 10c. Approvals. Zimmer, 722 Culver, Rochester 9. New York.

PREE 100 Different with Approvals. Henry Bards sy Armsglob Ave Rossyn Pa OOOD Packets build good collections. Write for Pres lists. Mysrs, Box 22, Lans-

downe Penne

BPECIAL: \$-50-sets-50, with approvals. Lawrence, Box No. 1818. Rantford 1. Coon. POUND mintures. U. 8 or Pereign \$1.00. Book Nook. We man #1. Mincasots.

%5-10 APPROVALS! Bargains exists Cole, 42-g Rinewalt, Buffalo 21 N Y

PRES Details slamp or coin exchange. 36 Superior Exchange Grafton Otto

56 DIFFERENT Scandinavia only 10c. Kimber Box 278, Norrhoping Sweden

FOR Free! Big new Hustrated catalog!
Albums — stamps — collections — supplies
"Stamps By Mail", 2123 Lunt. Chicago 45

FRES't Triangle—Diamond—Midget— Giant—Roosevelt -- Hitley stamps to new customers. Thrifty Stamps, Silver Spring Maryland.

343 DIFFERENT-43 countries 25c Appressis Ca Restler Box 1805, Detroit 31 Mach can

PRFE Regioner's packet Price list Stampinground, Box 55. Diastoniung Cons.

PREET Amount Quer Countries Packet-with approvals Sexon, Vista, Caltornia.

FREE 750 Mixed U S. Send 10c Postage Weatherby Medina, Ohio

300 STAMP hinges and 25 different Canada 30 with approvals Jaydes, 218 Dickinson S.W., Grand Rapide 7, Michigan

"GOYA Nude" set (Cataloga 55c) 15c with approvals Royal Slamp Company Tamagua 2 Penna

PREE Collection—over 186 different stampe of word commemoratives and mass natives stops farming men others at to approval buyers also Boott Adums Catalogs Res. Stamp Service Dept W-1 Bel. Ca. Jern a

U.S. THE SPA Sheet only Sc to appleants for U.S. approvals M. Haycock 236

SOULENIN Short Free if you request approvate Enight. Box 3779 Portland (8) Oregon.

14 DIFF 19th Century Onten to approved applicants. Rossom, 218 West 55th Sizest Chicago 21 10

SEVEN complete mint sats the approv-

SPORTS-pictorials—6 sets only Sc. Approvals Wirth, Norwichtown 1. Conn

FREE Sample—interesting Informative Enjoyable, National Stamp News, Anderson 2, South Carolina.

22 ROOSEVELT Commemoralisms 25c Interesting Approvals Robert Wilks Beverly Mass

FOR an title as \$8.00 you can put your ad note in the December issue. Get in on the Christman may in der right at die iver your sales to it direct to he 3 \$62.000 readers of Popt or Science by-sole class for this sour Bazze low rate you be always paid—600 a word. The December awar thinks and free bestiet. How To Make Money Out of Cass led Advertising. O. K. Kelly, Chartfield Advertising. Manager Popular Science Monthly, Dept. B. 352 Fourth Avenue. New York 16 New York.

ANTIQUES, RELICO &

FINE ancient Indian arrowheads \$1.00 Fine stone tomahawks \$2.00, \$3.00 List free Lear's, Grenn and Arhamas

GET Catalog #17 Selling 600 Historical Firearms, 20 000 Indian Relies. Coing Colwar Indianwar Muskets Puntlocks, Raffes. CDA 1-Piete te Swirde Baroneta Raminda Bufletzer de Percussion Cape Powde horne --Arrenheds Wampum I mahanta Spraf-Gemps ante D'acorda a brads Age co M nern's Fass a Marine Sheda Moun es Poessants Deerbrede Owls Quall Squitreis Electhorns Bio horns Bo wood ha Wood Baffamhorns Kentucky Riffer Winchesters Gold Dollats Carbines Profuse y dissipated catalog 35c, Herke, We-

SPECIAL, 16 Indianheads, \$,40 C vil war Bayonet (1 00 C vilwar Sword \$4 48— Derinead \$28 .6 Civ. war Minket \$28 50 10 Arrowheads \$1 86 Tumnhawk \$1 45—

Scauling Kn. ie \$1.5. Again Pyrite Molybdenum. Possil, Geode. Gempoint Crinoid. Blastoid. Gastropod each \$ 45. (Hecks. Wenona 38. Lil.

36 MINERALS & PRECIOUS STONES

PIND Tungsten mercury uranium with Mineralight, Free brochure, Write Dept P88 Ultra-Violet Products, South Pasadens Carl

CHEMCUTTING S. vereratt authority libustrated magazine tells how. Out rocks, make Jewelry 156 ade illustrating equipment, offering gems for collectors, cutters. Furth brings iterature Lapidary Journal, Drawer D. Paus Desert Calif.

GEMS. Precious and semi-precious, all genuine, from world wide sources, Deal direct, no overhead save money Catalog loc. Hill Co. Route 7-K Sa.zm Orașon.

OEMSTONES Marral specimens Every variety Lowest p. ces Postcard brings free book.et Plummer e. 3133D Bacon. San Diego J. Calif

QUARTE, Japper Agate and Catalog 25c Genro Eikhart Lake 2 Wisc

1 HOBBIES, COLLECTIONS

INVENTING can be an interesting and profitable hoots Write for complete particulars likelitate of American Inventors, Dept. M-E. 621-E St., N. W. Washington & D.C.

UNUSUAL shellcraft hit in plastic segmented bux \$19 00 value—62 00 postpaid. Ben Devidson 378 South 2nd Street, Brooklyn 11 New York

WANTED Cigarette, tobacco, cards
Write Charles Bray East Bangor Penna
HHIP Model Catalog Kits fittings 100
pages Money Back Coulous 50c Antique
Ca a venicie causing the Polks 316-P8
Pt (2) Ave New York 1 N Y

Pi (h Ave New York | N Y

UNUSED matchbook covers 100 different \$1.05-36 page Catalog 250-Charles
Edelman 1311P East \$6 Cleveland 3 Ob.a.

PROTO FINDSHING, PROTOCOPIES, ETC.

YOUR eight exposure roll developed with three prints each good negative 50c; two each the one such 30c Reprints 3c A few cents postage appreciated. L. A. Eastman, Bode Town.

24 GLOSSY photos \$1.00 (6 sets 144 photos \$6.00) Beau ful moders and different glamorous puses the to d you will like Catalog 50c 7 are free hands Co. Dept D-51 212 hart 14th Rt. New York D N Y.

CONTACT# 10c. jumbos 40c. 12 45c. Fumbos 55c reprints 4c jumbos 5c Free majers, Western Photo P8101, Box 296 5ar Francisco I Ca if

PHOTOCOPY Anything—Papers books. No darkroom, 84 x11 complete \$6 \$6. Fo-tollek \$555 Plainfield Lane Catelanal, 14 O.

FIT MS highest quality rapid service, eight super size prints 50c Camera." Box #280. West Chester Penna

23 MOTION PICTURES, SLIDES BOUND EQUIPMENT

MOVIE Camera Film; Smut rol, \$1 50, 16mm 100' 43 00. Free processing Better Films 742 New Lots, Brooklyn N Y

LATEST Beauty Glamour Films. Sample, 200 50 ft. only \$3.76. 230 brings exclusive catalog of movie titles. Empire Dept. PS-10. Box 23. White Plains, N. Y.

GUARANTEED Fresh smm roll, magasine, 16mm roll, magazine movie film, Culor, baw. Free catalog. Esc-S. 47th Holly, Kansas City 2, Missouri

9 16MM, S.ient-sound films. Complete rental library All latest subjects, Free catalogue, (sample film 10c) Garden Film. 317 West 50th, New York 19

UNUSUAL 6 16MM Movies Full color projection length sample \$1.00 Color Tru-Art Slides three samples \$1.00 Big catalog 25c (refundable) National Film Supply Toledo 5-K Obto

RENT 18MM sound films 500 reel. Large selection, free catalog U C, Film Service, 128 Chestnut St., Roselle Park, M. J.

MATIONAL Parks Catalogue and sample 30c.
Douglas Whiteside, Yosemite, Calif.

5 000 NEW-Used &-lomm Silent-Sound 34 Films International 2120 Strause Brook ayn 12 New York

ART Firm Blides, Free list, Samples 11 00 Price Brothers, 64-C West Randolph Chicago.

FOR as little as \$8.00 you can put your ad here to the December usue. Get in on the Christmas ma , order man and de tyet your saies task direct to the 3 992 000 readers of Pupu at Science Specia classifica tion Christmas Offic available for this leaue. Same it w rate you ve a warn paid. 30c a word. The December assue closes on October 25th Write tiday for order blank and free book et How To Make Money Out of Cass Fed Advertising O K Kelly Classified Advertising Manager Popular Science Monthly Dept B. 353 Paurth Avenue. New York 10 New York

34 CAMERAS, PROTO SUPPLIES

FREE Photographic Datgath Book packed with handreds of semantic a values att I and movie cameras lenger at dilatest accessioner Buyer savings for you in new and used equipment. Liberal trade to a lowances too in your equipment. Write new for your free copy to Cen rat Camera Company Dept 2-M 236 B Wabash Ave Charago 4 (Photographic Bradquarters Bince (886).

HASS Says: Trading cameras a national habit since 1916 Write to Bass the cd Hurse Trader A postcard wil, do Sampy say Bass I have and I want How much wil, you allow me? Satisfaction guaranteed Base Camera Company Dopt AO 72 W Madison St Chicago 2

PROTOGRAPHY for pleasure or profit Learn at home. Practical basic training Long established school Write for Free Book et American School of Photography 835 Diversey Purkway Dept 1746 Calcaguat

ADD "Spice" to home project an shows with colories and time Nicke idean saides 2x2 We to for Free list Mickeludeon Co. New Pie dner B.de Portland & Oregon.

BOLEX Hid Lunder at In factory parking \$182.00 Free cata of 1001 bar-gains Dealers Murt 11 Wilhard Are Mt Vernon New York

PHOTOMURALS, Your negatives of ours Catalogue 15c, Photomammoth, 17044 Vanuwen St. North Hollywood, Calif.

BUY Photographic Supplies Wholesait Films cameras projectors, enlargers bi-noculars, Free catalog Capitol Photo Sup-piles. 3428 Gundalupe, Austin, Texas

MUSIC, INSTRUMENTS & SONG WRITERS

POEMS Wanted to be set to music Free examination Send poems McNet Mas-ter of Music \$10-PS. S Asthandria Los Angeles Casifornia.

WANTED! Porms for musical settings Write Bongwriters' Service Clifton N J

POEMS Wanted Broadcast considera-Oklahoma City 2

PORMS Wanted for musical setting Bend poems for free examp atton Five B at Music Masters 646 Beacon Bidd Boslon, Mass

SONGWRITERS) Outstanding ethics. offer Hibbelet C-15 2:57 N Avers Chi-CAEU 47

ELECTRIC quitate ampifers whole ile Pree estatog Carvin PH Baidwin Park Calif.

SONOWRITERS! This is the Thing! Pres information Trans-World Music Co. 6354 He avenue Boulevard, Suite 236-4 Hopswood 22 Und!

SONOWRITERS! Send poems, Jongs Music Service, 243 West 72nd St., PS. New York 23.

TEACH yourself to play plano profes-tionally from notes, compose songs; or sing. Also we put cousic to your poems Music Teachers' Associates, 25%; Potters Lane, Orest Neck, N. Y

YOUR words given includy, recorded by professional planist-vocalist, Free details Wescourt 216 W Jackson Blvd Chicago

SWISS musical nursing boltle Musical movements \$1 00 Catalog 10c Bei, Music Bon 49. Planetarium Station NY 14. NY

RADIO, TELEVISION, SUPPLIES & EQUIPMENT

MAKE simple tubeless battery and dis-tance get in crystal radios Crystal and mastrated rastructions 25c postpaid Alica 427-8 Cilpton Ma

NEW 5 to 110 volt conventers 60 cycle 35 watt \$15.95 guaranteed, check or M. O. Minson Co. 1470 Midway Parkway, St. Paul 4. Minnesots

FREE 213 Page Radio Television E ec-trobic Ce a of World & argest stocks wast prices C mplete supplies for builders eaper menters amateurs privicemen Latest radios phonos television recorders sound equipment Thousaids of parts tupes test mattumenta hooks diagrams Top quanty money saving values they yours in a A ed Radio Curp \$13 W Jackson Blvd Dept 34-A Chicago 7 Ili

BUILDIR & Pictorial Construction Plans Free List Alena Box 24. Astoria 6 New York

MAKE Distance Getting crysta, radio that works Fully hastrated booket at een cepts Money back guarantee Francis Bux 5963 Creveland Onio

ENGINEERING-Service-Radio and Electrical Henry Twilmann, R.R. 51 Ches-

DIODE type crystal detector The Ideal for crystal sets. Instructions, Clearco Crystal Co. Box 1857 Milwaukee 1, Wisconsin

VEST Pocket Crystal Radio Send 10 cents for drawings Ball Cotter Washingtoh 18 D C

GET Ready New Por A Good Army Job New Code Votes Record Method teacues you Morse Code in just | hours que l'es you for new Novice Class Amaleur Radio Operator a license Scout eignaung traus
You get lour sides of code on two 10 inch
To RPM V.o.y to records in handsomely
I ustrated init office album Send only
14 00 Money back quarantee Dept P 1 The Ray run Company Box 66 Orangeburg New York.

TELEVISION Pater Eliminates giare ponthing to the eyes week by those at chios to neutralize actinic rays, does not discourt or distort picture 10 is inch \$1.00 .6 30 inch \$2.00 T V Products "\$50'g Mercuse Dept 4 Hollywood 44 California

TELEVISION Telescoping 50 foot Steel Mant housetop straple one man instance. tion with so element 4 stack V cone alchanne, antenna reception to 300 miles Complete installation kit \$60.00 POB Bakershe d Camfornia Check of Money Order Practical detailed fringe area in-atruction manus and tipe \$1.90 (Kil with 48 foot mast \$79.00 so foot \$115.00 Ad masta |8 foot sections top section 1-3 16"

COLOR TV on your set Full details 50c Cha.on Box [30] LaBadona Sta Culver Cary Chall

AMATEUR Radio license preparation Correspondence course Low cost Personal coaching Federal Electronic Institute, 34 R. Putnam, Dept. A. Greenwich, Contr.

17 BUSINESS OPPORTUNITIES

SCHOOL Students can make \$3 30 an hour Baturdays in your own neighbor-bood So initing Harry Waiters Medianpris | town

TO 435 00 Weekly Space Time Some Operated Mail Order Business Successful ped Lynn 5718-C Bankfleid, Culver City Camfornia

GOOD Paying Business Silvering mir-rors b study autoparts reflectors bicycles, bathroom Patures etc by late methods. No tanks of shop required outfit furnished Pres Booklet Quimertal Co., Ave. E. Decatur Illinois

ENVELOPES addressed accurately reasomably Fast Service. We have capable addressers in your city. Olenway System. 5713-X Encité. Cleveland 3. Ohio.

NATURAL Moiding Later, Extra thick Pres sample W Wooley, 115B Donald. Peoria Illinois

OPERATE profitable mail order bushess. Write Waster Service 4139-B East 112th.

MAKE money addressing envelopes Our thatra on te cal haw Gen Olenway.

HOW and where to obtain Capital? Free details Bur Service Wapak mera Oblo

BIG money Space or full time in your home No Sealing Spray New Maracie ? no shes Plush and Burde on signs radios and mobiles figure es lamps toys etc. Our hus tess is booming He p us fill hade demand. New day F is Brait methods. Material costs few pensies. You get dolmy fee namines compete power al 1002 N Los Angeles St. Los Asseles 15

PARUTOUR Earn Des. Pescinating pastime Or while Generale living min ature (Marg) Trees New sense is al Business or Hobby Aste, d. g smal on Free Dwarf Gardens, Box 155H Briggs Station, Los Auge on 40 Ca il

RECASI and harteries into new Latest achievements Battery Laboratories Min-DESCRIPTION

Profit opportunt y r Het me bond ese New mac, it e me'hod Pree book et or request P D Co 442 N Schoon St. With-Ra .3 Kansas

MAKE Money spare or full time casting Mr a. Tora and N velt at Bat who water at d chain store demand for Aules Buldiers Ashtrara Ba ka etc Keeps manun shed for up to 100 and more castings per hour. No experience of special place necesbeing placed Write for information and hustraluna of patterns needed Metal Cast Products Co Dept E 1890 Boston Road New York 60 N Y

Liquid Rubber make Sea ble molds. Free Sample Changy 1138 E 16th St Jackson vice & Fin

TRAVEL Apynhers Anytime Earn \$50 up a week Proc details Travel La Grange 22 Indians

IMPORT Expert Men-Women learn from established World Trader Your uwn problems would wide business by mail order from home wallout capital or travel abroad Experience unnecessary Free detatia. Mellinger, A-E Los Angeles 24

VENDING Machines earn big money! An investment as a w as 610 50 will start you in this fascinating profitable business that can lead you to the road of success and independence Routes can be established and operated in either luli or space time with he experience needed. Write for iuli deta is and our Free catalog illus-trating our not candy gum and stamp vendors also pin ball machines music boxes etc Write immediately to Parkway Machine Corporation Dept 8, 715 Engor Street Baltimore 2 Mary, and

MAKE Money At Home as renewal headquarters for all magazines. Big Christmas Supplies furbished Write for Pree cata-McGregor Magazine Agency Dept. 510B Mount Motris Il.

SELL by mail; free details; instructive booklet 25c. Manhattan House, P.O. Box 51-L. St Albana 12, New York

BOOKKEEPERS Operate simplified bookkeeping service CPA designed minimum entry system limitation mama \$1.00. Kern 4842A Vinciand North Honywood.

CASH In Make Reflective Nameplates and novelties, Easy, Big profits, Free samples. Highlight, 362-8 Stewart, Turtle Creek Penna.

POPCORN Equipment Points Chip Outfits, Long Eakins Company, 5163 High, Springfield 10 Ohio

START Mailorder Bookshop—Everything farnished 25c brings booklet samples, ex-citing idean General Publications. Os-sining 1. New York.

SEWING Machine Spare Time Repairmen Wanted \$125 00 week reported. Hang out your Shingle". We train and furnish you everything. Write Taylor Service Hamilton PS-10. Ohio.

ZARN Money At Mome With Your Type-writer) Spare time! Details free Edwards Publisher, 1915-PS, 12th Des Moines 13. In.

DOLLARS daily writing. My way guar-inteed, Details, ideas, hopkiet, rask 25c P. Lorb Cincinnati 36

BE An Exteriorhator formulas accrets what to charge froe particulars sic Ray Knox 1206 Wajnut Street Phila Penna

MAKE Mai. Order Business pay Noces eary Basic Knowledge Recommended by Stail other experts, Only 25c. Maxted Book Agency, Western Springs 15. Ill

HIOH sarnings Setl Lite money-back-quarantee Binoculars, Details free. Lite Scientific Co., 122 Audit, Circle, San Astonio. Texas.

225 WEEKLY Working two hours daily No canvassing No manufacturing Lycke But 3471 & Cattland 13 Obio

PROFITABLE bone business of travel abroad, Lifetime opportunity in Expert Trade. Free Booklet, American Expert Couragiors Box 543 Westport Coon.

OUT Into Plattics the Professional War The inexpensive way Learn where how to contact we ting customers. Make better plastic products by new easier methods have on materials. Information worth fortune. Details free. Plastic Service, Dept. 82% East Noston 38 Mass.

Bld HOUN World's most complete in via hie feature remnating instructions in cuding (1 campies to Mesons automatic laich steel tous assembly material for life \$3 complete fluoranteed as repre-sented Details free. Walsh, 804 Main, Bul-Inlo 3. New York.

TRADE Magazines. Help You to Buccess Det latest copies through our easy to get acquainted service. Nearly 1 200 business votat mal eraft hobby selling etc 230 cinnafications cornering ad interests Pres Commercial Engraving Publishing Company 348 North States Indianapolis IP. Indiana

YOUR can profitable home business Preserve live flowers to last forever Spare or full time. New discovery—simple—fas-cinating. No experience necessary flend \$2.05 for working equipment, instructions and valuable ealer plans, Satisfaction guaranteed or money refunded. Herman-een. 210 Fifth Ave., Suite 1502, New York 10 M. Y

Skill & Install Purnsess Burners Cab-

BOOKEEFFERS-Earn up to \$536 month etzving sirali firms part or fan time Proved plan, simplified system, Particulars Free. Tax Sever System, Dept B Ft.

RELAX! While matimen brings floriers in da y fen ! life magazires to a lie. w Panyko M. Townsoud Res Brunswick H J

BIG Paring home mailorder business Deta a free Jackson New oundland 4 K)

DROW Mushruoms Coular shed Spare fu'l time We pay \$3.00 pound Free Sook Washington

RONEY now! Training course A Head Start in Meeting Ventileting, Air Condidiate profits Your own bustness Pull part time. No investment of experience reeutred. Complete with sales ald: \$2.90 postpaid, Harrington Institute, Box 1036, 9t. Mattews, Kentucky

MAKE modey addressing envelopes Enbank \$34 East 32th Bartlesville Obla

MAKE Rubber Stamps, repelt dolls learn invisible researing repair setting markines Catalogue of to Idena " Universal Hos 10 6-8 Poorta II.

MONEY to new greaterest dought atta Start in Ritchen No amoke Sea stores. Pres recipes S May Co., 3605 South 15 Ave Manneapoils 7 Minis

PIOURINES unpainted free illustrated Het, Haverty Products, \$23-4 17th Street. Altoons, Punna

MAKE Perfumes At Home, Write, "Carer Laboratories", 1914 Cheuteau PS-B19. St Louis 3. Missouri

MAILING postcarde selling repeat merchandine is profitable Everything sup-piled Details free Gurden Publishers, Box 23 Pawticket & I

WANTED—used records, 45's only Write P-L, Box 19-8, New York City 36, M. Y

MAKE firefile mobile Cast plaques hosterde ngurane Pres sample' R. Tooker 136 A Chestant Hamilton Ohio

MAKE Tough durable plastic-le pound Makes attractive floors, walls, built-ins roofs Build good bome, \$150 00 runts, Bays Laboratory Oziahoma City 8

PLATING Industry needs you Operate part time home workshop with ful lime profit Our two books Plating Lifetame Treasures Por Profit and Mudern Plat ing Techniques & mot fied we show you how to plate bang shoes levelry at ser-ware move the shift industrial products Or y \$4 ht postpaul for both books Compiete line of pin ing essemblies all stren or any type plating Use our seu patent rente, pun to get started with it is experiod Burgest agent ment of metal and ongs help abor mounts Cate ogs sent g sh borts Buy direct from world's arrest and oldest manufacturers of brunged bety ther moun'ines. He ty wood Bronet Supp ? Sales Department 1424 Sant Lat Otroot Los Argenes 33 California

MAKE Money Addressing Envelopes Write Males Company 215-Pd Wiless Ave. Columbus & Obto

OPERATE Profitable mailorder business Particulars free, George Lenhoff, Lincoln 1 Nebraska.

TYPISTS Profitable business at home Complete suppregnied information 500 Opini 821 B Irving Park Circogo II for

EARN While You Sleep Corn radios

html Women - Everybody likes Candy Learn to make professionally at home (Our 48th year) Ragadale Candies East Orange New Jersey

COCURCILAZED Concrete Politery made without moids. Patented method. Cometery products nove the time, Besement leaksea, d Money making projects, Booklet details free Men only Mational Potteries. Grand Rapids Ministrata

BMAIL Inexpensive Type-Plater 4:00 troplates me a s mirrors pou metala Profitable home business or hopey Types Bit alels CA Houseon 18 Years

YOUR Phone is Your Portune Send for free descriptive circular Richard Selection of \$15 Richard Va

ELECTROPLATERS make good frames Pres bruchure Joseph Eishner Electro-pis ing School St ordahurg 646 Ferna Ahalik I me office work to your own home for Men and Women Pres details

Buziness Publishing House, 127-M Bread St., Boston 18, Mass

RXTHA Dollars Spinning angora wool for us. Angora House, PHM, Spri after It.

SAWDUST Turn It Into cash, Twenty methods. Instructions 10c. Charles Company 12-CMA Norwood Ohie.

NEW Past "Low Priced" Game of Skill Big Profits, Details Iree MO=22 Indus-tries Box 225 Long Beach 1 Carl

EXPORT-Import: Represent manufacturers! Conduct barier exchange War-peace time big business. May-sell by was. Let New York experts show you Now International Trades. 266-8 Pith Avenue New York 1

JOLLY 6 Buttery And Boot since 1948 Doubles life new buttery Adds to alle and or efficiency any justery in working popult anits agents and independent service existions Se of \$1 00 tomple parkage-particulars Jully's Battery Aid, 240 Winfield Street San Francisco 18 California

INCOME from local information, No selling, Write-Neberco, La Verne S. Calif

UF to 11% return on ever-the-counter securities. Send \$3.00 for heat (3 secure of only imagazane on these Hidden Ya.ue investments also dividend handbook Remarch & Promoton Jenkiniann Pa.

PREE 7 , Ib all subber personalised door mat surus you fast profit. \$40 per day days You take orders heep deposits We move in names ship finds and convert balance from customers. Free stock came coursed samp a salas plan shipped min Send \$1 postage & handling Wite Ray & school Muchell Rubber On Paul Lea Augeurs de Cautornia.

SECURITY \$10,000.00 yearly possible. Investigate Boyd Pitastmone Building Pitasurah 22. Penha.

PREE Booklet "How To Make Backyard Profits!" Pikett's Piorence, Kentucky

BUT it wholesale, Manufacturers, Distributors, Over 850 608 items Literators free. Olsen, 1231-H Rast Third St. Deluth 5. Minnesola

MAKE Perfume at home-write "Inter-national 4347 Paraell-PS-18 Chicago

PROFITABLE Home Mig Mane waterwas hand cleaners household & auto specialties, etc., by simply adding water to basic concentrates. Over 300 profit up to \$500 monthly on steady repent orders, Wastern G Aircraft, Los Angrace 10

MAKE pinecons ministure trees sensmentals. Instructions and two. large high-River, Whilamston, Mich.

HEATING And Ventilating—Air Condi-tioning Labrary You save a huge 50 % of pro-saher's price on this sensational offer one of the most suriting we've ever mode! You get the word a prest complete most leventy, 'ustrated authoritative hiene-atudy nourse in principles design se ect on and application of Heating and Air Conditioning App iances and Systems for readen to und commercial use Coms lete I brary of his big books each indexed. Over 2 800 fact studded pages many hundreds of tables charts disgrams photos drawings Eas) to-Po is we question and shaper instruction. Here 2 Everything you I ever need to know to become a well-paid, top-ranking expert in this excitingly important field. All the facts alustrated on Bueprat Reading Architectural Drawing Sheet Metal Work Innintion Heat Louise and Onine There me Dynamics Logarithms and Tables Purpages Unit Heaters and more! Frepared by IN of the nation a top engineers and authors in Our super of these hand-somely bound after stamped returns to severely impled in a in roses it must be And come first served his it ib 4-Volume Library published at \$24.00 Year send only \$8.08? Money back it not fully delighted Dept. 1651-C Popular Science 353-4th Avenue New York 10 N Y

144 FROM Square Foot Plywood, Jirsaw Woodari. Bridgevater, necessary Write Massachus#tta

OPERATE profitable mail order husiness. Spiculid opportunity For details write. C. Wentworth Waite 114 Lincoln Avenue. Syracuse 4. New York

MCCLDING Rubber \$2.95 pt \$0.95 gal. prepart Plastercraft Supply Co 3061 84. Cair Ave Cleveland 14. Ohio,

PREE Polic 766 Money Making Deals, Plane Formulas, Supply sources Ko'a-m to Company Box 572 Dayton 1 Onto

HOMEWORK Addressing envelopes, Details 35c Siegal Bux 183 PS New York 2,

MOLDS Rubber Moids made with aircure Laten cast thousands of plaster statuon Livernture Major Chemical & Lates Co 25 Al estud Mt Boston 19 Mass

SELL \$2, Fire Extinguishers, Locally Malterser Lorenc Box 1984S, Albany 1 N Y

OPERATE Profitable Man Order Bullnose Wr to Mac a Bervice 218 Vise Shelbyville. Indiana.

\$250 WEEK reported! Free book Odd Successful Businesses " Work home! Expect something Odd! Pacific-38B. Oceanside, Ca linerals.

MONEYMAKING OPPORTUNITIES

QUICK profits taking magazine cubsell Publishers Service. Woothead M J.

DETECTIVES Rarn Big Money Experi-ence unnecessary Detective Particulars free. Wagoner, F-125 West 66th N. T 54.

BCHOOL Seniors—Earn sensational proftiful Oradustion Name Cards Largest selection Outseils all others. Pres sample hit Printeraft Dept P 1435 & Ein. Street Scranton & Pophs.

\$100 UP invested 2 months pays 4'2%. Profess by Regulated \$1 opportunity bookhet Kontonist Box 225 Bushiil H J.

BE Appointed State Notary Public New! Details. Stationers, Heloies, Texas,

MARE money at home Complete inproduct, Easy to make. Different from other items, Cost 30c, sells for 81 00 Postage prepaid, Send \$1 00 to Robert Butler 306 Troy St. Dagton 4 Once

WIN Cash, cars in Prize Contests' Write for copy filled with current Contests, win-ning hints and tips Send only 30c Wright Contest Digest. Dept. 20, P O. Box 2366. De Louis 8, Mo.

MAKE Money Addressing Envelopes at Bone Our information reveals how Only 30c Business Burson Dopt of E. But 2224 St Louis Mo-

MAKE and sell as inexpensive proven Stem Welcomed by smokers a thout ma-chinery as I do Detain 25c Thumas Saids Son 301 PS Carridon 1 N J

EARN Money Eventual copying and du plicating comes cartains a for advertisers. Adservice Argyle 2, Wisconsin

WATCHES Eight Wa them other out standing brands Kapertly reconditioned proced fow for quick great profits bend for Pres cata of Plymouth Jewshy 163 P. Cana. St. Non York 13

H c) Profits Make fast noticy oner the montey trees Christman pusher lies Sen-

MANUPACTURE Shinestone and Pearl Jewelry at home, Latest creations, tre-mendous profits, no skil, needed, Postcard turnes disaffuled to dog of our resalutes etc A V Cutt Co Inc 210-M Fairh Avg New York 10 New York

PRINT without a printing press; Big

PANT se the mage missors complete make See through back \$5 for complete that suctions Fr thee Setars free Carrall Movelties 232 Merrimon Avenue Asheville North Carolina

\$18 000 YLARLY possible lantages new demand, raise Angora Habbits stock for maked, production bought, literature free Don't wait, set on ground floor Address Muldas & Co., Windsor Musouri

\$250 WEEK reported! Pres book \$66 Odd Buccesstul Businesses Work bome Expect "Odd"!! Pacific-38B. Oceanade Calcordin

WIN sontest money Omeral Contest Bulletin gives hundreds of Los List cur-cent contests and rules Sample 25c Gen eral Contests, 1888-A East 5th Duluth hi processing in

\$10 000 PROPITE At Home! Lifetime Op-Portunity! Pres advertising method his de your own Home Ma to der Bus ness Cap-ital experience unnecessary Start much time No merchandise investment. No ad-Pertising risk Exciting practices Copy Pighted notatized proves successful plan 20c Satiolaction gualanteed Treasury 148 Stores New Rocces is 1 P. New York

\$44 IN Personalized Buby Record Books Bell By Mail Use Same Literature We Do No-Co-Ro Oakland 5-P Calif

PRFE Sample copy leading mailieder publication Worthwhile mintermating oppertunities included Stamp App related Variety \$1 0 Circuit Ave. Newton High lands \$1 Massachusetts

DOLLAR Maker ' Tips." Ask for folder Louis Wassen Steeles ie Managert

\$100-\$200 WEEKLY No set ing or manufacturing Part or full time Muhaffer

WE pay you highest rates for hand-decerating greating cards Work at home Exson Detroit 26

MAIL Order Agency at home, Receive \$3.00 orders and keep entire amount, Mul. (25c) for samples & instructions. P & Acms. 1311 Widener Bidg. Phila. 7

EARN extra money! Spare time Write - D'Tarmelt, 243 Church, Newark, Oblo PLATING outfit, refinish metal parts no lank required, information free. Norwood Plating Co. Norwood 2, New Jersey

AWY Formula Permished \$10.00, Lak-ort Dak 337 Tuenom Arizona.

ASSEMBLE and sell Beautiful Swins Musica Churches Complete Kit 83 25 P P

WHAT you sell is free. Only cost, advertising Plan \$1.00 Metard Bux 343 Both syn Penna

36 FORMULAS, PLANS, RTC.

FORMULAS trade secrets for nearly everything Catalog free, Creative Pub-

PORMULAS—All kinds, Latest products, Literature from Kemico, Park Ridge 18, Ill

PORMULAS for his profit fast seeing products From literature Majestic 536's Man Elitart Indiana

LABORATORY tooled formulas Lists from Pont Box 635-18 Terre Haute Ind PREE formula Catalog Anything analyzed \$25 00 Western Chemical Sairm Or eg-ki

PLASTICS

LT CTTP Portage Any size sheets marged Square loof (13 x 13) cost 1 14 ft 1 20 ft 12 of 12 LT CITY FIRE AL

HI Profits Ofth Jewelly Pres cats que delas s P of Plastice 41 B Putton By New York City 30

PLASTIC Shorts Rods Tubes etc. Proc List Plastic Supply Co., 2001 M. Grand M. 6 et Louis 7 Me

NEW liquid plastic Clear colors Cast without heat Embed Boners insects of it Sam det | curve See d Pic for Wr Imale Cutaing and New Sains Manual shi wing how to make money at bome Custon to Dopt, L-102 Woodstock Illinois

1" CITE Published scriple torer Quantity prices. Special bette niote Immediate ahipment Complete cata ion life 25c airmailed, Gens-O Lite Box.

REPAIR Page Teeth with Plint Son! Here appeals and set! harder by derivate pastic Oct tous sumply handles twelve repairs Outfit complete with instructions or 3 85 00 Grant Dental Laboratory 219 "Ib St. Lan Argeies 14 Cu l'orris

PLASTICRAFTERS suggestes wholesale Literature 30c Cosmogonitan But 1"4 PS

41 CHEMICALE & APPARATUS

NEW 1884 Chemics, and Apparatus Out-24s for Home Experimenting Photo-Scales. Microscopen Chemicals. Sinlegical and Laboratory Supposes in Small Quantities Catang 25c Estate shed 1911 John H. Wonn 194-it West 23rd Street. New York 11, N. Y.

LUMINOUS PAINTS WILL BLOW IN CARE. Six colurs Fairmennt Chemical Co. LM Liberty St., New York City 6

LABORATORY Apparetus Microscopes. Complete Chemistry Se a Minerala. Uranium Ore. 10c brings cuta-oq Porter Chemical Company Hagerstown 1

SPECTROSCOPE for quick chemical analysis 83 00. Cutting Bone Los Altos Cul.

ILLUSTRATED Catalog Chemistry mineralogy, biology 18c, Tracey Laborat rice, Evalution, Littuois

LEARN Chemical Analysis, complete hits with instructions. Catalog 15c B & S Amateur Chemist Supply, 191-40 115 Ave. St A bans 12. New York

CATALOG of chemicals apparatus kits minerals, Uranjum ore, 10c Rez Labora-tories, 2040-B Birchwood, Chicago 45 H.

CHEMICAL supplies Catalog 18c, refundable Laboratory Bules Bux [4] Brighton. Maria

OH Boy! New Book Of Science Experiments Permulas Secret Processes griber with Calalogue of Laboratory Suppany Dept 15 2200 North Avenue Chicuso 47 Lumbus

CHEMICALS and apparetus for indus-trial analytical and private laboratories. Catalog 15c Dept. M 26 Biological Supply Co. 1376 Mt. Mope Ave. Rochester 38, 21 1

25 DIFFERENT Chemicals Quart quantitles 12 85 Al Greatury 43 Amboy Bt. Brooklyn 12 New York

HELP WANTED

PORTION & Latin American Employ-ment 1911 Furnign Service Directory : place Up To-Minute Pacts on Military & Civilian Construction Covernment John Major Ot. Listings Aviation Transportation Stemmable Lines Mining Importers, Esporters How When-Where to apply apprincipus torms Hot List Pirms Hirton S. 00 post paid Grobal Reports P O Box 683-8 Heat) would 20 Carl

PORTIGN Propagation Construction men but dire frades he pers office men nthern rierated in Fireign Projects Blair wasse quarters train Listings of him actively work is no C 0 Poseum live to 1 et to, Pr. et a Bend hi for Figcur Chair action Combiend in and Amile cut, in Fritis Freign Bers en Harens Dent Po to Bus 193 Metuczen New Jesser. Mit an en punment agenics, no leut b

ENIOY Tremendous Pentils on ing Christian Discuss Armual readup for hunter Liferature Proc AdPro Box 363 FS Springhed II.

MAWAIIAN Employment' Complete list complet Buck Having Haved

at 000.008 CONSTRUCTION Projects, World Wide" printed Monthly Poreign & Domentie employment, Proc application blancs tells flow When-Where to apply \$1.00 complete, Chokal Reports P.O. Box 883-PX, Rollywood 28, California

AGENTS WANTED

NPW John open in settling for & name address for five free at see of Oppost or or Mone tura money making aude peting he of eds of compatites who I have you well of fact time it superprise needed Opportunity in E Jackson Dept. 18 Chicago 4. Illinois

DRESSES 18c, Conta 22.00 Blouses 35c Five Catalogue; Crown, 184-PB Monres Street New York 2

MAKE Wedding Profits Bell shittellone Had shieh & M J.

AGRNIS -300% profit or line genuine cold window setters stores and offices free samples, Metallic Letter Co., 437 P. Clark (hirago

COMMERCIAL Deep Frying Course Mock Chicken Less Pointons. New and proven methods Learn about this money-makers field \$2.50 PF Cuncresson Tuleds 13 Ohio

PHOTO Sepostion Agenta Sell beautiful hard cole of plan it enlargements and her sations. Dow photo compacts Finds bracelets forkets std Collect deposit we deliver Printable side the Send card for Free sample hit Wivel Portrait Co. 3343-A.

NEED Brits Cash Take orders for per-ser al initiased belts and buckles case budges the budden etc. Chaire of 3000 erch ema Pres sales til Soug-Past Dout, 1425FA Presidence R. I.

NYLON Uniforms, Immediate delivery, immediate profits, Pres sales hit Superior Pabrics, Dept. A-18, 3836 Market Philadelphia 4. Penngylvania.

JUST Oct | New thrilling sensation in Christmas cards Make his money! Show lustre forth antice brilliants, Amazing values brill mane to fur at 25 up Also imprinted but the acceptant statement many affect that 30 Pree Fama es u h name sereral 11 boses on aparaval Jey Greetings 507 N Cardinat Dept M 43 St Louis 3 Mo

BIART Your Own Business on credit Atmays year we been 1 637 Penters with 63 000 to \$28 000 in 1950 their average 36 -04 We happ's stores by ament on credit 200 her emerges they be also expe-mented to store the store Weighterful onper any to one please t or "table bust-bras backed by word wide india it Willie Rawletge; a Dopt J. C PSC Freeport 1L.

PRET Samples, and amazing plan giv-ing you gorgeous Dress without penny cost Buth name today with dress size, Har-Ruth name today with grees size, Ha ford, Dept E-435, Cincinnati 25, Ohio.

ANTONE our sell Moover DuPont Nylon Uniforms for beauty thops wallfried Socials pursue others in white and culture Excusive Mylon Top quanty Low priced Exceptions income Best future Equipment (see Write in a Moover Dest. 8-16) New York 1) N Y

AT Last Semething new and semestional in Christman ca do Make extra shorestact Show gorgeous actina vectors Setal lice peter bet se offered. Geta eare orders Papa up to 100 man profit Free Semision 30 Christman cards with name 30 for 41 25 up 80 assortments Personalized Sont matches and Ministery of the Several 11 00 boses on autowall Write Pure Co 2801 Locust Dept 141 M St Louis 360

IS \$210 a week worth a permy mostcard to you. Then rush no divide a name and address for apocial Free Trial P on that or is amount own Automatic Refrigerator Defroster than but cases. Write to Mr. Lewis. D. Frost O. Matie. Curu. Dout PSC 16 6 M. Michigan. Chicago 2 1s.

DO you need manes? \$13.00 is rours for selling only 50 boxes of our 300 Christmas Card line This can be done in a single day Free samples. Other leading boxes on approval Many surprise tens. Function of the factor of the case Christmas Christmas

CHRISTMAS Cards At Jobbers Prices
Large selection to at assortments like each
in hundred lots Imprint Cards Money
Folders, Offt Cards, Pictures, etc. Make
more profits selling our line? Catalog free:
Three sample boxes \$1.00 Elfee 430 Morth
Weis Chicago 18

BRAND New! Amazingly different and smart Christman cards bring you big money. Take over scalers last Pave up to 100. rath profit Christman cards with name to for til 25 up B g line Personal statements and book matches Get sam a assertments an approva improva P se Write today. North Star 31 Glenwood Dept. 18-A Minneapolis. Minn

PREE Merchandise to new customers chi 50 retail value-your astertion fron-eational "get acquainted" offer Rush 25c for Illustrated Wholesale Bargain Catalon and Pree Merchandise certificate. Save up to 50 on 2 000 everyday necessities and november for able Johners. 211-2 Mortis Despis nes Chicago 4

MAKE money selling ties. Pres catalog Write to Philip's Neckwear Doot, 236, 20 West 22 St. New York

100% PROPIT—Postage stamp photos from negatives or prints perforated sheet form gummed backs. Free details, samples Mational Photostamp Co., 1418-P Third Ave. New York 28

BE A Money Maker Represent magasines year around. Wonderful home work Big Christman profits now, Liberal commissions. Everything furnished Write for Pres catalog. McGregor Magazine Agency Dept, 510A, Mount Morris. Ilt

SHINE Shoes Without "Pelish New Invention. Lightning seller Shoes gleaulike mirror Samples sent on trial Errotes 135, Akron. Objo.

OOLD Lacquered and Silver Bign Letters. Windows. Doors. Trucks. Standard stress Pentry each Free manpole. Atlan-O 164 West Thib Chicago 20

ABBULUTELY Proc. Big package actual camp a fabrics and civic press latter of deases lingeric hostery etc Take orders. Complications big Send to motor Melvi, in Co. Dept. \$315. Cincinnati 26. Ohio.

OWN A Big Moneymaking Few and Tore Clething Business Men i wash mile \$2.00 pants Me topcoats \$1.20 Jacksta 800 shore Fe Ho experience sectionary Free Whosenid entaing Superior 1250-18 Jefferson, Chicago T

prew Plastic Mending Tope. Just press en? Repairs clothing instantly. Lightning celler, Samples cent on trial. Kristee 134. Akron. Ohio.

SENSATIONAL money maker—washable woo on stacks skris shirts—pusids and sould culors Nationally advertised Sanforan taker Nation reinforced childrens teen age Territe repeat business Booms Fran Start immediately Pres Sales Est. Weak-Em. Westgoot 2). Conn

NI-Prefits—Gifts—Jewelry—Pres calaingue, details, Filot Plastics, 67-32 Fulton St. New York City 30

WHERE to Buy 200 000 articles direct from Manufacturers have by buying direct Sent From Your Profits Under The Spotlight Gram Pub. Co. Ellwood City 6 Processivante

I'll Put & Shoe Store Business In Your Porter' Mation's Leader trains you to make Big Miney Fit men Sumon Proc Sample Dirit Write Tuday Contol idated Shoe System Dept 135-P26 Chappews Falls Wincolain

CALENDARS, Advertising Novelties Matches All styles, including Religious Varnished. 12 Sheet. Girls. Hundreds of Advertising Novelties. Book Matches etc. Pleming Calendar Co., 4570 Cettage Greve Chicago 37 Illinous

Tid Daily Profits selling embroidered wool and cotton uniforms, initiated backies, beits, badeen choice 3 900 cm-blems. Free sales hit. Much-Past. Bes 480FS. Rosnoke Va

SHUPPLE. Pla Come. Inctory direct Maruma! Webb Distributing, 4948 West Chicago Ave Chicago S1 III

MARK Even Amas Money in Your Own who reads business Write for our Free to lustrated who coals retains lasting gifts watches jess to premiums and toys at prices below the wholesale market Intertibuters to the trade for twenty years. We accept sample orders Write Louis! O Paust, 223 M oth Street, Dept PS-1661 Phile. 6. Peniss.

WHY Lug Heavy Cases? Carry samples of Efficiency Cards in pocket Earn to aid to do y spare time Doubers Jobbers manufacturers frag hardware storm need em Reasonably priced good continuations Samples details to a cereir interested over 21 Write today Efficiency Freducia Mantherne, New Jersey

24 O Profits In Space Time I il send Pres Assistment P I & se Bampies fine foods houset aid because we to ambilious blen-Women who head money Priends neighbers buy eagely bend he money Just write blair Dept bitsT Lenchburg Va

BUY wholesale 25 000 lterns cale orne

SUPER liquid mender fixes most any thing including found metal glass falries Tube 25c pustpaid AA 2216 Mobile Chicago 20 1st

ULTRA Blue Blick Signs le Sett 35c 1 800 slogans T'sll" comedy recidious genéral. 15 sainpies \$1.00 Lewy \$12-67 Broadway, New York 2

NOW would you like to get paid for giving away first quality splan stock ings at the That's all they cost if they can within guarantee period to three months: Advance cush—big busine He enpe ence needed Just write actions We deliver on lect Posicard brings just free sample stocking and sales outfit prepaid. Earder Corp Ballyton 14 New York

dal asidem Distributors fast militar doctume provery direct from factory Big picture entaging from Pickeraft C-18 Bank Attentory Manachustics

BELL hylons' No experience no money needed. Hypest commissions Lowest prive Mighest quality Money back guar antae Write for free to see kit. Lide No-siery Mills, 140 Church Street, Dept. F-1 New York.

AMAZING may earnings Make \$3.00 to \$5.00 an hour spare time. Show friends neighbors our new sight-selling Christmas Everyday eards wrappings, stationery gift items. Also get extra honuses and valuable merchandise prizes. Send today for 30 Free imprint samples and hosts on approval with computes instructions. Prompt service. Select Art. Orderings, Dept. 1, 112, 278 Washington Art., Chelson 50, Mane

SALESMEN, Money-making sideline Culendars and Advertising Specialties Highest commissions advanced, Free New Care, Ruch name Advertising Specialty Macufacturing Co. Brooksyn 36 N Y

PALL Sales Self properlyd rotary movers 30° 37° Cuts exceptions Parm Products-PS Excessor Springs Missesser.

SELL only 50 boxes of Xmas Cards & Sire 535 is Yours See to friends peigh-hars ghurches such std in Spare of Pull I me His besulaful das includes Wraps of free, 5 ca da & books noveluse Same amprated Xmas pards religious & requisitiones Sells 36 for 61 M & up Stationary naphics matches with name on Over 186 numbers Costs nothing to try Write Por Pres Samples On Approval Bainhow Cards. In H & Lit St. New York City 3 M Y.

RAT Deth (cheese figrores) Local franchise Best big users Farst Products-MD, Excels or Springs Missouri

Maxic AN Feather pictures Bell on sight 200 - profit Free details sample joe stamps drivin-SQ Apartada 2016, Mentos C tp

SELL Big Money-Maker to Men and Women, Easy handwork makes fast-solling useful articles. Sample free, Sunmade Company, Brockton 64. Mass

BUT Wholesale thousands nationally advertised products at his discount. Sent free The Wholesale Plan. American Buyers' Bervice, 629-T Linden, Buffule, N Y

PRINTING - Samebooks - Envelopes - tags From Justinated entering Error Branz 51 New York

Money-makers! P. or Jim Jim 600! Kirsch, Spring Ve 109 3 New York

BE Our Catalog Representative, Contains household TV general Merchandine items. We supply everything tree. no expense for you. Write Teleron Company 41-05 Lawrence, Flushing 55D. New York.

BARGAINS!! Save up to \$0%, Belloone, combs, novelties, notions, Carleten House. (PSM) Texas City Texas

BE. OW Wincesale Watches Jewelry App sances Premiums & verwate Cont. wate Culture Cu. Porsyth 2 Georgia

PREE book "505 Odd Buccesstul Bustnesses." Work Home! Expect something Odd Pacific-36B Occasion Ca il

PALL DEW Cathing Lawret Prices Operate from home suto store Ecommus Prints H & Cataing From Sall 606 D 13th Piace Chicago 1

A A A Securational Tailing Christman & Birthday Cards Pull tage and card clearly tage Merry Christman 130 - profit Retain 25c Samuele 35c Sec for 11 00 with winnersale prices Mines P O Sec 18214-R. Los Angeles 33 Calif

NICKEL Silver hey checks—Key shech stamping Outile Catains from Owneral Products 11PH No Penti Albany N Y EXTRA money quick So Muni ver Polish and Plating Liquide" Cloth applied Particulars free, NuSilver 568-P\$18, New York St., Autora, III

H MIGH-GRADE SALESMEN

MAKE Money with famous, coar-selling Bornes on shirts—source time full time side are Pabrics, outfit Pros. Boston an 60 Bortford Dept O 11 Boston 36 Mans.

EARN Sig Money Part Bel, Speat-qualfit advertising much uniforms to govern factor on So, or stations ste Pres or or but Topos Dend 5418 Rochester Indiana

ADSENTIBING hook matches—Cash in on his demand and Union Label matches Cuts for all businesses and publical parties. Free powerbouse set ing kill low pieces protection guaranteed on report orders—Cash commissions Superior Match Co. Dept. P. 1861 7530 Green would Chicago

MAKE money showing heighbors how to brautify yards with glorings flowering brusts and trees. Quick bearing Dwarf fruit trees. World-Pamous Stark Pater ted Varieties produce abundant harvests champion quality appear peaches ether truits, Even small plets produce fruit for family-use and to sell, Beautiful Sales Kit Pres. Stark Bre's, Dept. 30102 Louisians. Missauci

AD Matches! Bell Amazing Designa-26 36 46 and 366 light book matches Biggest most cash comm saless every business a prospect Law prices for high one ity Repeats Start without experience menwomen Ind part time Buy Nothing! Sales hit furnished Match Corp. Dept., PS-22. Chicago 33, Ellisseis

UP to 800 to in a week spart time and tellored suit for rouncel without paying one cent, Write for plan and Pree Sample Case. Pioneer Tailoring Co. Congress & Throop St., Dept. Y-1121 Chicago 7 Ili

"PENSILUBE" New actentific lubricating pencil for home shop, office Saissmen write Reardon Products Peoris, Lidwis

SELL Advertising Specia,ties and Executive Offia for gld established firm Good thing for man with wide acquaintance among business firms Opportunity for husiler who cam to make money and ten t sire d to make as a Desemp your eats business trith no Investment Leads given after you are selablated Best so by sea son now on Write today Newton Mig Co. Dept PS Newton loos

A Pair Of Shops As Bonus Big money making shoe line Mers a nomer a dress work shoes and boots Newest B,r ng Step Cushion construction Lighter softer acce or wearing lower price Ortho-Vent B 1051 Setem Virginia

WANT to make real miney You can positively make \$34.00 a day and up self. bug a brand new from group to every true of food and beverage store factories Laboratories Hospitals etc. First time officer tired Write for Free Detains I day J. ha son-Hartman, 53 West Jackson Bird Dept. PS 18 Chicago 4 Ultimos

EDUCATIONAL & INSTRUCTION

DEED Correspondence Courses and Books sold and renied Mister buck guar-atiles Caland free (Courses Bought) Les Minister Pagel Ausbassa

NIDH Schurd- En Classes Study at bome Spare time Diploma awarded Write for Pres catalog RBA-4. Wayne School 2017 N Sheffield, Chicago 14, Lil.

HOOK KERPENS! Increase 1 set Parts Ings Operate purposes, trees sted Day lar-A Week Bookkeeping and Fan Bern-tee Pust or apare time Details Pres No observation E) is Not 303 Credar Grace N. C.

START & Collection Agency business Very profitable Quickly learned Weste Cole & Assertable Syracuse 2 N T

PIANO Tubing Page Lourn this printable profession at home. Our Tonometer and mechanical side make learning may No how, edge music necessary Diploma granted Largest and pidest echoni-blut year O I Approved. Write for hooklet Nose Bryant School, 77 Bryant Side Washing on 16 D C

9200 WEEKLY Reported! No selling Pres booklet T J Burlage Roanuke 4 Va.

MEDICAL Laboratory Technicians in preat deire d. We train you it your own home Cats news free Imperial Technical Institute Box 951 B Austin Train

LEARN In order to one of America of Briest taxon a schools Write book 10 Empire Is notate of Lathering 422 East hth Hamelon Pa-

HECOME a Doctor of Parchology or Metaphysical Teach secret of content and happiness. Win degree of PaD of MaD Solve mental worries, Pres book College of Universal Truth, \$163-K N Clark Chicago

LEARN Plane Turing Repairing at bothe in 36 days. Ut. to sed income Phopograph recordings, tools and instructions Capital C School, Department C-1033 129 East Mich-

EVERLASTING Life. The long awaited desire of man to find scientific proof of sternal life is fulfilled. Stated in simple practical language of electomagnetic physics which opens new fleads of endeavor and leading to ustalkate instruments, com-Munication Send \$1.00 kells for your in troductory copy prespend Times Pub- ! Batters \$11.50 First Mt. Yearns Wash

LEARN Auctioneering at home working with successful auctioneer Revolutionary method provides classroom training in spare time. \$100,000 daily often earned by trained auctioneers, Advance Auction School, 5044 North Newark, Dept. 204. Advance Auction Chicago 11

MIDLAND Lanotype School Charles City Iowa, Civilian, Veterali courses, Pres

PRACTICAL Nursing—Learn Fastiy at Home Spare Time. Big demand good earnings. High School not necessary Write for free facts Wayne School, Dept PH-3, 2525 Sheffeld, Chicago 14, Ill.

USED Correspondence Courses and Ednestional Busics Bought S of Rented Calvage Proc Educational Eschange, dummerville. Georgia

U S. Gov's Jabe' Men-Women 56 000 john open non Start high as \$44 le work Experience usua ly unnecessary Can you quality. Oct Pres 32 page book shouling Jobs materies requirements nample tests Franklin Institute Dept Wester Righmeter New York

STOP lorgetting Good memory pave Newly discovered method britise amozing states Is and 1 N Y

Welding School B & P G.2 Truy Ob.a. VIII COULTACT Host equipment Ca and Free

INCREDIBLE' Unprecedented! Look un-"Гетаопа "" 444 Bijou, Box 1727-VG Mosts wood 28 Calif

WAKE Up your winning ability Activate your ldie access powers. End milies wir ries Oct aread Enjoy rring New thought continue Behanist Mustery method gets e so to an every come or no cost. Details see t free School of Personal Psychology Tenth Fivor Washington Bidg , Louisville 2 Ky

Al OFFIRA Trigonometer Calculus In- filleridua, and instruction From details New Correspondence School But 21 St Johns Brocklin 1) New York

BOOK KEEPERS' Read What you? should know about a bookkeeping service

Sellance of memory amaningly ampliprotogy Studie 2016-8 Sunnyaide Chicago 35 Jacktoons

HARCUI ne you tike it Book et teta how he Mastrolia, ht-RC Jane Hee York City 14.

CHEKTAIL Lounge Bartending and Managetrent Home study or School Traca ing American Parties Chicago & Blitton American Barter ding School P 134

EARN 850 00 daily bome or office Rush teason coming, Details From Universal, her 664 P Springfield, Missouri

FOR as it is as \$6 on you can put your ad here in the December lasue, Gel in on the Chilstmas mail order rush and deliver Pour as so to h direct to the 3 bul out read ers of Popular Se mice Specia classifica tion. Chies fruit Chies, available for this axis flame out rate you up a wast poid-October 25th' Write Luday for order blank and free book et. Him To Make Money Out of Class-fied Advertising O. E. Re v. Class-fied Advertising Manager proping at Science Month's Dept. B. 252 Fiscily Avenue New York 16 New York 1

DETECTIVES

DETECTIVES Work home. Travel Rypersonne universary Detective Pariscalure free Write Wagundr P-122 West auch Wagoner P-125 West 98th New York 14.

SECRET Service Sugerprint training at home, in spare time, Write, Associated a N.H. Cabada

LANGUAGE OUTFITS

rectly master Spanish, French, German \$1.25 Anderson Box 855, Mountain Home LISTEN and Learn A Language by Lin-# 344 AT Atlatio any of 25 languages through Linguaphone Conversational Methof Add to service job travel opportura-Veterans Training Linguaphone Institute 34.0 Rockefeller Plaza, N Y C

BUSINESS SERVICE. INFORMATION, NAME LISTS

MAILORDER Operators! | 000 - profit se ling. He R sk Radio Advertising plan 4.4 broadcasters commission bank citing details, 15c Herbert Rimon, 56 Park Avenue. New York City 26

MAILING Lists. All kinds 1000 \$5.00 Dixie Service, King. M. Carolina.

RAISE Capital for any legitimate busihere proposition under the ideal hystem what I your problem. Tucker Busicess Service 3613 Warner & N. W. Washington 10 D. C

13 000 NAMES College Teachers, \$19 00 Lynch List, 402-APC Raziett, Baitimore

SPECIAL SERVICES.

ARTIPICIAL Eyes The world's finnel true to life artificial eyes of plantar Won threak roughen or discusor Send old webh ting eye even though cracked and disco well. I who make one anactly like it in pins se \$25.00 Money back guaration Dr. H. R. Patrick D.D.B. 466 A. Whitehood hade Atanta Ca

SILVERPLATING spec a) Cresmor & thenne 6 of We do not merne platting Bend, te Dreaden # .verpintern \$67 E Jefferpun. De oil 1 Mich

AUTHORS SPRING

TEN Steps To Well by Success revents How you can write stories possess arthrops for publication Details Free W 2 Mer-

I Want New Writers Experience thingsessary Earn at home spare time Details Pres fie ndere M Oummings, 446-15 In-de, ende ue li de Colorado Springs, Colo

ADVERTISING

ADVERTISE 24 per4e 46 Newspapers. 51 A Luta Pres Advertising Bureau. 16511 P Suringseld Chicago 41

24 WORDS in 56 Weekites, 24 96 H J Darnell, 730 Hare, Jackson, Tennessee

ADVERTIBE: 60 Texas Weekles, 83 50 (34 Words) M Pennebaker, Kerrville, Tex.

CARTOONING, SIGN PAINTING, CHALK TALKS

NOW Is Make Money With Simple Cartuotia -A book everyone who likes to draw should have it is issue no obligation. Simply address Curious sta Exchange. Dept 1810 C Fleatant H 1 Ohio

BE smart. Get in Art. Let me start you Pree Nick Nichola Arts PS 30 Adams Chicago Luthous

VULN Cartoon drawn by an expetienced int Newtown Conn.

BARCIA'NS on Famous Art Courses Moreymakers for Ama curs etc Literature lice National Artists, Dept C 401 North Marsails, Dalias S. Texas.

CHALK Tasks, Laugh Producing Pro-gram 4, 60 I sustrained Catagog 186, Our-tous at Buida Outstonh Wisconsin

R CINS increase sales sconomically make em Mat any kind 4: 80 mp Postal brings suggestions and prices free Or send us your requirements. Signpost, 200 Mar-dick Rd., Richmond 24, Virginia

TYPEWRITERS & OFFICE MACHINES

PRINTOMATIL of course Post Cura printing Dup tentor \$15.75 Envelope Additions of Mark on \$20 to Postaburgh Typewill of Company 330 Q Pourth Avenue. Pittsburgh 22. Pa

TYPEWRITERS. Printing Devices, Office Machines sur iss appulances. Diale Graph. King, N. Camilina.

RUBBER STAMPS & OFFICE BIFFILLS

THREE time Rubber Stamp with stamp

3 LINES 50c. Fads 25c Signatures 52 66. Printright, Wauwatosa Wisconsin.

SUPERIOR Rubber Blamp three lines \$1.00 u.e 400 Pad 400 dater 750 50-30 amplicated stationery \$1.06 Catalogue Prompt service Johnson From But # S. New York City 24

PICTORIAL rubber stamps 'sample 1' star 50c). Stampico. Stall Quincy Detroit 4 Mrb

PRINTING. MULTIGRAPHING, ETC.

FRINT without a printing proce! Big Profits See page 41

HUSINESS Printing Samples prices INVENTORS When you are satisfied free. Howprint, 723-8 Euroce, Webster, 'na' ; a hard invented some hand of your Groves 19. M shours

1000 RUSINESS Cards \$2.50 Prepaid | samples Free, Reliable Print Ehop. 205

1

PRINTING-Small lots specialty Save money Free samples, price list, Bonnie Vale Press, Laconia, New Hampahire

QUALITY Printing Book etc. | th bear Adams. 36 West Washington, Chicago 2 Ili

PHOTO-offset Printing 10 000 (5123812) Bond paper black ink-\$22.50 Abell Press t | juid Avenue Brown in 20 %

PREE samples, prices Quality work postmand hast service Sutton Printing 141 Ray Water us Comment

ECONOMICAL printing. Free prices and Westig offer Bone man Phis 604.

100 B'axii LETTERHEADS \$1.00 Postpaid T so not some Bare Printing Had-

BUNINESS Stationers Summaria Sainples free Mero Products of Morrison Punning amber. Perila-

PRINTING OF TRITA. et parties

PRINT your own eards, stationery, circulate advertising, flave money, Simple rules Print for a bers, nice profit Raised printing the engraving too leave home Me toric Connectacut

PRINTING Presses Type Supplies Lists Inchesons Berries Luranum Penna Je Turnbourn nervice

MAKE Your Own tubbet of Fling rule Buil modding process. Piralrubber. Arayle. Wilsoner B

PRESSES Supplies Paper entalog for-Custom Bon 2.1 ft fipr puffeld. M son-

PATENT ATTORNEYS

INVENTORS Write for free brachure 'Evidence of Invention." Labiner World Dutsdang, New York ?

INVENTOR & O ide free Frank & Ledermann Registered Patent Atturney 164 Nassau Street, New York

INVENTORS For Invention Record form contact Carl Mr or Regis cred Parent Attorney Westworth Building New York

C A finow in Co. 4-427 Snow Building Washington L. D. C. Regulered Patent A others Write for the emption

INVENTORS II you believe you have an invention we can make a preliminary search on your prominer and advise the ntiether no chink it can be no ented Berol for copy of our Parent Hooket. It was to Protect hour favent in a d. I nertich Becord form No chidation Meat it was be man in Davidson Beautiered Parent Be man in Davidson Victor Building Wash tagten I D C

PATPNT Protection That we known regar satism & , send Y as productly been tensered and a thout obligat to a horker. portion from defailed 3 formation come a ing steps to take to profest your in ention by a United States Palent. Victor J. Evans & Co. Merlin M. Evans, Registered Parent A terney 541 L. Merlin Bundara Washington S. D. C.

DAVID Charnoss. Patent Attorney 11346 Sunset B'vd., Los Angeles 49 Ca'll

PATENTS Irving | McCathrab 110 Mr. ach en Bide Wastington | D. C Neg viered Patent Atronnes

INVENTORS Learn how to protect your invention. Unless the inventor is familiar with patent matters, he should engage a competent registered patent attorney or ! agent to represent him, We are registered to practice before the U.S. Fatent Office and prepared to serve you in handling your patent matters, "Patent Guide for the Inventor" containing detailed information concerning patent protection and procedure with Record of Invention form with prevented to you upon re-Quest Sixhoul object on Clarence A Oldrien & Harrey Jacobson Recovered Patent Atterness 128 K District hational Building Washington, D. C.

INVENTORS When you are satisfied wime without shilgs to a year fill senial t as to what stem y a should take to meate a Pate it. We is Patrick D Beavers (Pormerly Randolph & Beavers) Regis-tered Patent Atty 124 Columbian Fldg Washington 1 D C

INVENTORS W thout obligation write the official explanant for every of of the take to recure a Patent John N Ra duph Registered Patent Attorney 307 " bit I de Waat iet o 1 D C

FOR INVESTORS

PEARCHES Put your patent searches to the hands of a Registered Patent At 1 of it Agent as he a a fee to during a binhie , stentabilte tepurt. Recief uf If we that him upon request and the ormavers Registered Patent Attorney 838 Co-lumbian Bidg. Washington 1, D. C.

AVENTORS Without obligation wells for prermation explaining the even yes should lake to secure a Pa ent on year survition John W Handolun Registered Patrick Afforday 100 Columbias Bids Was 681 in 1 D C

CASH For your idea, 200 manufacturers need inventions, patented or unpatented List free Invention Bureau, 205-5 Clinton Oak Park Illinois

(AVENTORS, For Invention Record form contact Carl Miller, Registered Patent Attorney Westworth Building,

INVENTORS' If you have an invention for sale patented or unpatented, write Institute of American Inventors, Dept. 36A. 631-E St., N. W., Washington S. D. C.

INVENTIONS Promoted Patented or Unputented Established 1911 Write Adam Fisher Company, 123 Entirht, St. Louis.

INVENTORS II you betree you have an sine claim we can make a nie enjuary whether we think it an be to un ed Bend freder Your Janes on and Intention. Reci d form No business McMotres Berman & Day door Hegistered Potent A tor 1820 1423 Victor Building, Wunn-mun' 1 25 C

INVENTORS-If your consider your invention to be cometting of importance take steps to princed it with a Coised Marke Patent which gives rose the right to ex ide cliers from making noting and be I set parent on as commed. Patent Protection for funes are on race steps to take to secure patent protection. Massed trans & Oo., Merlin M Evans, Registered Patent Attorney 443 L Merim Southers

INVENTORS Learn how to protect your invention. Unless the inventor is familiar with he ent matters he should etipage a receivest registered patent attories of sgent to represent him We are regis ered to practice before the U.S. Patent Other and prepared to cerve you in handling your patent matters, "Patent Guide for the Inventor" containing detailed infor-mation concerning patent protection and paredure a the Record of Invention ' form a 1 he forwarded in you upon re-quest without at gation. Claret of A. O Brien & Harry Jac boon Regulatered Patent Attorneys 12A E. District Na-tional Building, Weshirston D.C.

PATENT Searches \$5.00 Including set ent on re Some tellable search as conducted his paint that a to been Piet profess. ther forms 46 hear service Petent Se cure I citude \$45 B. Fennsylvania Avenue Wash 1 gton 4 U.C.

PATENT Searches \$5.00 Including top les of closest pater : Same recabit SADE IF INDIE 48 hour Armail Service Record of Invention" free Capital Patent Service, Box (154-8 Wash,ngton 4. D C

IF you have a new idea, development or invention get an expert appraisal and opinion before you spend hundreds of doilars. Over 25 606 inventions screened and reviewed. Write for details or send \$3.50 with complete information, Marketing Bureun, Gables Building Evanston, Illinois

INVENTORS, Obtain patents without assistance, Save time and money Elizainate the unofficial disclosure of your in-vention. Complete simplified instruction manual including directions for making your own patent search at home \$3 50, An invaluable asset to every inventor Order your copy today Examine five days, if not satisfied return for prompt refund International Patent Library Post Office Box 1412. Washington S. D. C

DEVELOPED drawings, engineering, derighting of inventions. Confidential Cost estimates without obligation. Adamse & Bednar 65 W 42nd St Rm. 212-A New York 18 New York

PATENT See of each of the hear service Patent Aprilimations and Brawings pre-pared. Protection forms free, Write M as Ann Hastings Patent Searcher P.O. Box 176 Washington 4 D C

PUBLICIZE your inventions! 76 National Magazines—51 Million Circulation! Detail a 750 18 A Simust 18 Park Avenue New York (15 16

INVESTIGAS promoted payer led un paretted. Complete services of Jayes it manifes Ital Landt to Private phia to Jerre

GET your own paient? Easy! Cheap! Secretly! Patent forms furnished, Write Bankin Legal Purms, Lock Box 2028, Cary Indiana

JAVENTIONS WANTED

INVESTORS Bundreds of manufacture ers have requested our assistance in focatthe narketable new prists to Complete information. free Institute of American Inventors. Dept. 30C. 631—E Street N W Was given 4 D C

this NTORS What have you patent-ed patent ce ding are ship to manufac-ta east Brak et maind free Address Market Contacting & Date Bervies, 13106 92 Longwood, Chicago 43

INVENTIONS Promoted Pairnied of Unpatented Established 1911 Write Adam Fisher Company, 181 Enright, St. Louis. Massouti'i.

CASH or corelly for your invention. We provide this opportunity Free details. Inventors Patent Exchange, Inc., Dept. D. No to 4 1 Cons.

CAPITAL, Manufacturing Sales Pac 1ties Avaliable G & M Company, Trattle Station Box C Minneapolis 3, Minneauta

INVINTIONS Wented Patented or Unpa en ed 20 seurs es serience Promoting inventions, National Service Bureau 2122 Meramec St. Louis 18, Missouri.

MANUFACTURING

ANYTHING made of sheet metal, odd fittings heating ventilating ducts. Beary Siein Grape Street, Pittaburgh 10

44 MODELS, MODEL SUPPLIES

SHIP and Yacht model fittings: blueprints. Send 35c for illustrated catalog No. 36-Listing hundreds of items, A J Pisher, 1603-2 Etowsk, Royal Oak, Mich.

Bit P M steam most complete (tile in New Frie and M s parts place bricks laids Liestob diotors New Houstrated on along 35c, Junes 31:50 & Co Lua 236 Mate 21 Boston Mass

BUILD Historia ship models, complete hits 50t to 56 Cu'n, or 15e Ideal Moders 21 West 18th New York II N Y

SHIP Model and recht supplies som-Diete iaree 66 page entanque 30c W

STEAM engines bousers contings Cutaine 25c Ant a Bobaboy 2207 Price Rabway, New Jersey

MOST complete stock. HO Trains, Soats Airplanes on Coast, Mail anywhere Try us. "Hobby Craft." The Bon Marche, Beattle 1. Washington.

HOME CHAPTEMAN

so All new full size lawn ornament and accepty patterns, up to 20° high, Only 41.00. Mastercraft 1828, 7641 Oleott, Chirace It I Least

LEATHER, tools, lacing supplies Free Cutalog, National Handleraft 196 William St. New York

STURN your space time into cash Make Thick selving highly profitable lamps every home a prospect No expression of special took required New 1851 54 page frames figurines and bases of samp converters boring compounds and dusers of sorters coids pipes harps finials besen and hundreds of other parts everything you need Special 4 page section shows 6 beau It ut tampe in hit form ready to assemble You buy wholesale se I at retail make buy profits Hundreds doing it You can too Bend 25c today for catalog and wholesale price not Refundable first order Grazilli Co Dept. \$00-Ais. 27 S. Desplaines. Chicuro 6 Il ino a

GUR biggest Learner and Craft Catalog pet! 1000's of items Bond 25c (relanded with 1st order) Russo Handiers it Supplies. Dept. O-9 243 5 Spring Los An peles. Oalifornia

MARE leather berty het finds purses Bur catalog and genuine steerhide key-hi der, 100. Tandy Leather, Box 307D Turne Ohin

MAKE Sel Artificial Flowers Cor-tages Chen in Do a June 27 Starting has Woodfibre Leaves Size scraft, Rolling stones, Sequins. Pindings, Wholesale Prof-ligral Catains for Loveland Models. 4507TC102 Lorein, Cleveland 2, Otho

PRESS book 'Practical Painting, Wood Pinishing shows how to get professional results. Pure sure finishing workshop Workshop projects home decorating Complete Mod write brush at d spray methods Ir ras and to never seen It a Prec Write Boome Craftsman, 115-P Worth St. Bew York 13

EXATIONREPLANT For Processor of Profit Make may to assemble purses below we were by 100 other items for gifts or to sell. Bend 10c today for hig out alog, Largest Leathercraft stock in U S. J C. Larson Co., 830 S. Tripp, Dept, 1276. Chicago 24.

DOWELS made Easy, Fast on Word Lathe Complete details \$1.00 Powiers 14.2 lith St Churchton, It.

CHERRY chests, chairs, tables, stools wall racks, miniatures, For you to assembie, finish, Ostalog, Ebi Eby Reproductions

BANDSAW Jigsaw owners, let your machane bride extra profits, Jun, Pres de-

66 FUIL size Jis daw patterns of beautihis theires fusingua tors haven et Plan How Where to Se. Only 8, 10 Mastercraft 1948 1941 Opent Cricard 31 Asset Brade

VIOLENMANTHS Ama cure Profester a r mapping limit raced catalogue for reto ded Premier V. .. Bupp ica 430 A Breifen Los Augers 13 faul

100 FULL size jig saw patterns up to 30" on \$ \$1 60 Pattern Bervice Medway Managertsparts.

PRINT without a printing prisa Big Profitst Gee page #1

LEATHER REMAPT Tools leather Embossig Plates Craft Arees sies Des Ca augus 100 Lands John Engineering Company 16:3 Ma Fort Worth Trans

NEW items needed for mail order sales Bigham, Brooker Florida

LEATHERCRAPT Tools, Lacings, H. Byrd, 1406 Montrose Avenue, Richmond. Virginia

P'easure and profit. New style handbag patterns, beits, Leathercraft school G I approved, 25c for catalog (Retail d (at order) Dept. PS, Apacha Leather Co 3604 & Washington St. Phoreix Arabita

ALAHASTER—Homecrafters, Now you can have comething new and beautiful that can be worked on the Lathe, or corved with ordinary woodworking chinels Write for information and price list. Alabaster Sales. 422 S. W. 23rd St. Oklahotan City # Ok ahoma

LEATHERCRAFTERS' Everything for the leathercrafter large Illustrated catalog 100, Art Leather, 411 Joseph Ave., Rochester 5, New York

\$6 FULL state patterns Laws Ornsmerita Toya Noverties \$1.00 Modern Waderaft Bagmaw Mich

LEATHERCRAFTERS meral ornaments burkles purketbook accessories Cusmopull an Metalcrafters But 176-B. New

LEATHERCHAFT Copper tooling textile painting many other crafts Big free cataing amous succeptions you need Kit Kraft 317 Melross Hoorwood 66 Ca ff

PROPERS ONAT Type furnished firms ing and refficients surgites Beautiful Beautitul complete complified that server manual Leaners W J

LEATHER Bend on y one dollar for pound assortment of fine glove leathers' : Get pieces in assorted colors shapes sizes' Wonderful for leathereraft ornamentation patching: Bridgeon, Northville New York

SOMETHING new Log cable Bank Easy to make, Nice Christmas presents for hiddies or grown ups Send \$1 00 for sample Robert Suiter 206 Troy St. Dayton 4. O

LEATHER—assorted colors Ideal for purses billfolds hox coverings guaranteed weights. Make wonderful gifts, if the --\$3 M. post 13 bs -85 Th post Jumbs box 30 lbs. only \$11.00 p.-d. Order now No C.D.D. a. Leatner Crafters. But 413-P. Evanston Language

FOR an little as \$8.00 you can put your ad here in the December haus Get in on the Christman Engl-order rush and deliver your called to birect to the 3 992 000 readers of Pips far He nice Somera crass c a pour flame low race you so a nave paid plus a word. Ine Docen ber wave creek on Octaber 25th Weste today for order blank and free bushet. How To Make Money Out of Class and Advertising O. K. Kelly Classified Advertising Manager Popular Science Monthly Dept. B 352 Pourth Avenue New York 16 New York

BILLD IT TOURSELF

BUILD Your Own "Tractor" Piec infor-Ra in R tain D 5 Camptions to Camp

STREAMLINED Built-in Kitchen enbi bete to "t a 7 h retien 12 ustrated manual Bi61, Kittanning, Pa. describes designing and construction A.-92 90 Thumbert Company Newton 11 Lema

bookset on how to build, \$1 ou Other Home Building booklets \$1.00, H C. Lightfoot Civil Engineer, Rephase, Hotel Civil Engineer Richboro, Penna

ORANDFATHER clock building made easy Shoptested place Spirit Century parrow waist or stately straight side Spirit America, dollar-both plans dollar fifty Kuemyel Clox, Minnespolla 16

FREE He do-ok build sawm a machines live era tractica of elera 250 shop, farm home machines Nichold Co-Dept. C-1100 Purvis, Miss

WOODEN circular saw adjustable out, portable Save % Plans \$2.00. MW Util-ties 706 Avenue U. Brook yn

OID GOLD, JEWELRY. WATCHES, ETC.

NEW catagor late our Adop action than plated new ry supplies Rhinestones Feat a Rich Lam lete deliant of the Pic-Barry's 47-12 Branford Place Newark 7 N 2

HIGHEST Cash Paid For old. Broken Jewelry Gold Toeth Watches Silverware Demonds Sportacles Platinum Free in-formation Satisfaction Quaranteed Ruse Service Company 20-Y East Madaging Chicago

RHINESTONES jewelry settings cam-Novelties Dept CL-4. Griffith Ind

WRIST Watches New guaranteed, Jeweled his as norment \$7.15 Moran McKan less Tonson 4 Manad

CAPH air maned in Off or Broken Jew eire Gold Teeth Matches River Pari Shipping Container Satisfact on quaranteed Chesto Jewe'ry Exchange 6236P8 South Meant St., Chicago 25 III

ASSEMBLE rhinestone jewery Inter-ductory assertment \$1 00-Montague. Box 746. Wilmington. Delaware.

JEWELRY Making Catalog, Milady-Pair Co., 36 Maiden Lane, New York City 38

GOLD plated Jewelry Supplies, Rhinestones. Moonstones Fearls, catalogus 10c Hobby Shop. 30 Pruspect St., Paterson N J

FOR as little as \$8 00 you can put your all here in the December Issue. Oct in on the Christman mail-order rush and deliver your sales talk direct to the 2 892 000 readers of Popular Science. Special classificaissue. Same low rate you've always paidsoc a word. The December issue closes on October 25th Write today for order blank and free booklet "How To Make Money Out of Classified Advertising." O. K. Pourth Avenue New York 10, New York

TOBACCO & PIPER

ROLL 200 pleasingly mild cigarettes for particulars free. Pete Moberly, Box 311 Ower course Kentucky

FOR THE HOME

CRESISOR to sible. Use Pepe II. Rejuset a es fermenta son ac'un saves pumpat a con a deciderares and con masses & who in S to 10 Back But, tary Free desc. ptoff Co. Ben on 14 Mana

WATER Softeners. Buy direct from inc-tory, save money Write for price list Shurnoft Water Softener Co. 4242 W Liabon Ave. Milwaukee & Wisc.

MAGNETIC knife and tool rack Details free, Willard's, Canoga Park, Calif.

OF INTEREST TO WOMEN

START Printable Sparet me Heatness Making Attention, Plowers wouldbre cursages eften wide a and crail thitrations severy bure ties Mast up hits materials With coale Prof crast Catalog D a press LANE D & Proud & 2 Ofthe

VENETIAN By 4 take Practic of Cottora 30e rard Pres color chart, Moore,

TO FOR SAUK MINCHELANDING

DRI SEES THE C at a 82 bt. Blouses 35c Free Late a c C C own 164 I M Montes

COMPLETE Blocks Foam Rubber A.1 tract of a disk bears Hurry wite for place set, AMC Supply, P.O. Box 1440. Fort Worth Texas.

Cloude Fine M.M. Factory Iresh the at a Two torses of 30 65 00 Postpaid Or guarantee, L. Burr Cigne Pactory, Sold Easton, St. Louis 13, Missouri

11 PEWRITERS \$12 50 Dupileators \$12 50 Typew ters 1.6 North Sprace Wichita 7 Kansas

Ols Par CR THE OF FORTSCHE OF loved one from photograph or snapshot. Ideal gift. Extremely low price. I Pescais Is a 1048 Church St. Station, New R A

78 WANTED MISCELLANEOUS

At RAP Mercay (Quicksliver) Tanta-ium Banach later Measurgical Podges to Ritan and thin 35th in More Su Physical and the

Wil our at percit 5 house or form (Price subject f harket ouds a man Metalleignes, Piet ca t t a " has lived) has Me en es Pe de to es Pa

WANTED Best prices for Air Tools Riveters. Nut Runners Squeezes Drilla, etc. Any quantity Write-Wire-Phone The Tool House 1417A North Broadway Wichita Kab

MERCURY-Highest prices. Free Containers, Wr Write Moreury Terminal, Nor-

WEARING APPAREL

WORK Shirts. Only 75c, Savel See ad on Pg 69 Young Products, 2005 E.m. burst. Detroit 6. Mich.

TATTOOING SUPPLIES

TATTOOING Outdis, Supplies Illus-trated test Free, Zeise, 120 Leaser Rockford. Illimois

DRAWING, SI PPLIES & EQUIPMENT

DRAFTING and artists' materials cate-log—thousands of items—25c (deductible first \$2 order), Gordon's, 219 Medison Chicago.

DRAWING Instrument Catalogue 20 pages description and Illustrations Write for free copy V & E. Manufacturing Co. Box \$50N, Pasadena 30. Calli

TREAKURE FINDERS

TREASURE Sunters! New 11-pound featherwright M. del 101 Incutor for g.-sd st.-ver and minerale Money back guarantee best available Asia Geografic Louisers for granium prospectors Complete information free The Goldak Company 1500 W. O encare Bird. Giotidate 1 Canf.

GOLD. Bilver Metal Detecture Owner Coun ers for Dran um Minera ante Sea sal, na new fu y suaranteed mode a Nobe Finer, Information Pres, Detection Co. Ca for a

BELEUTIVE Metal & Mineral Delector Righly sensitive. Bevolutionary new design Write for literature, Gardiner Electronics Os Dept 36 2016 N Depton Phoenal A is

TREARURE—ht-Scope Gelger Counters —Mineral Locators, Why buy something interior when you can buy the next at a lower price? Backed by years of experience Puly guaranteed by factory Detects minerals, metals, gold, after, colus. Paymer t p an avaliable. Proven superior performules Pres 18 page litustrated bookiet Funer Research Lab. Inc. Palo Alto, Calif.

GEIGER Counter, Complete, \$28 75, tates one flush-light bettery each year of use Morgan Instruments Co., 21426—C Valeria Canona Park California

INSTRUCTIONS for building Radio Treasure Finder \$1.00, Wrss, 1941, Fran-ces, St. Joseph. Missouri

WATCH REPAIRING

WATCHES Completely Repaired: \$3.50 Ave Brock 61 K Y Berkuntte 1365 Ofmatend

THE Modern Clock All about clock repair 502 pages, 173 Uhistrations, 84 95 postpaid, 19-day return privitege North American, Dept. 21K, 2018 North Avenue Chicago 47 Il.

WATE HMAKFILS complete informative estatogue 26c deductible, Bengal Company Curvet City Coul

WATCHMAKERS' Journa, contains helpful hints on watch repairing, \$1 00 year Sample copy 200, Dona Co., Box 3212 Daytona Beach, Fla.

WATCHMAKERS Tools, Maler als Supplies Repairs Catalog Onles, Mos 1000 Clucago 90. Lil

MISCELLANEOUR 19

CAN You Make \$40 06 A Week truing at home in your space time? Write if sid a Kar mape in 11 North Unforms (Enclose stamped addressed east oper)

DRESSES 160, Costs \$2.00 Blogge 25e Free Catalogue, Crown, 184-PC Montoe Mireet N T 2.

TOUR Leather Jacket renovated expert-Free circular, Berlew Mig. Co., Dept. Perguet N

OUTDOOR Tellets. Cesapools Septic. Tanks cleaned, deodorised with amazing new product. Just mix dry powder with water; pour into tollet. Safe, no powden Save digging, pumping costs, Postcard brings free details Burson Laboratories. Dept. E-53. Chicago 22. Illinois

RECEIVE Count Mails, magazines, cata-logs! Three months 25c, year 50c, Wad-dell's Directory, 341-D East 76th, New

HAND Me Wipe" Wateriets couns hands better Write, Colony DenceWax. Davenport, lowe.

PANNING Oold Jesson Cutatogue Be- | gittes supplies Mong Books Maps Where In Oo Free Old Prospector Bux 7 PDZ Lodt Co if

INTERESTING folder free Letters remailed Books, Pictures, Stamp collections: Orabbag 30c, Sell-out lot \$1.00, Box 48. Brooklyn 25 New York

SWISS Musica, Church miniature snowcovered, Plays "Silent Night" when door opena Bu, di fam ,y tradi sin 8" 56 postpaid Wit form to assemble \$5.96 M. A. Bars Littmose Jone

WIDE Shoes For Men | 2 to EEKE only Pres catalog Money back guarantee, Hitchcock Shoes, 2046 Hingham, Mass

BIG Mails Three Month, 25c year Name Listed Directory \$1.00, Harvey Teeple, Decatur. Indiana.

M NERAL - Treasure Locators - Octave Counters Superior performance lowest prices Parment p an apar able Pres after oure Fisher Research Lab Int., Paso Alto, California.

SOURCES of Supply 50s each, Kelly 5644-A Whitcomb. Detroit 27, Michigan

SEEK Oold Crantum Buring Treasure Latest a m cost super amounted equipment P ee dernture Coen Scientific Buk 131 D Gieb E un Bligtreife.

HYPNOTIZE Men Women and Chadren Complete illustrated step by step rourse Former, e serie guarded secreta expused by noted hepr at it. Lesson els sen expusins his method of hypnotting subjects metantly a id against there wil. Only \$1.00 David Bishop 200 Broadway New York ?

FOR as little at \$4.00 you can put your ad here in the December issue Get in on the Christmas mat gider rich ard deliver Four sairs to k direct to the 2 pay 600 readers of Pigit at Science Special clais Sea tion. Critician to 'to avalence for this bout Baine i, w rate you re a wave paid soon word. The December laste closes on October 25th; Write today for order blank and free booklet, "How To Make Money Dur of Class field Advertising O K Ke in Class field Advertising Manager Fourth Avenue, New York 18, New York.

PERSONAL

"HOW Can I Find Out? You Can Informs ion discreet's developed Any matter pe con problem a conhere Wirid-Established 1977 Renschahle Con fden-

BROOKLYN latters remained 25c each Marth, 6411 Cooper, Brooksyn 37 N T

OOLDEN Gate-Letters mailed 25c each. Caswell, 1352 18th Avenue, San Prancisco. California.

BORROW by mail Loans 336 to \$300 to employed may and women. Easy quick Completely confidential. No endorsers. Repay in convenient monthly payments. Detalls free in plain threlope Give occupa-tion. State Pinance Co. 210 State Pinance Ridg Dept. D-14, Des Moints S. Jone

PSORIABIS Sufferers Has everything | fa led to be ng even temperary relief from sea on lesso a said led ago. Then we tell day for Proc into retable lote mation he income. pany Box 2007 S Creenand Orio

FRANCE Germany Switzerland Remail. 1 3 letters \$1.00 Stamps from Carrin Page. Hauptposting, Basel 1. Switterland

DETECTIVE'S Opportunities Detective Particulars free Write, Wagener, P-125 West 86th, New York 24

CONFIDENTIAL Information for single people, leading to happiness, romance.

We today Dr. K. Miles, B.S. M.S.

Ph.D. Haman Reattions Counselor 601-0 South Vermont, Lot Angelet & Canf.

17 you are nervous write The Berlinas-ter, Porestville B. Virginia

PREE exciting letter information J P Literature Publications, Box 186. Breaklyn 27. New York.

KENTUCKY'S cares, 2 colored post cards | POR Security And Peace use my New 5 to Fred Rows Horse Cars Kentucky Intersectation of the Lord's Prayer Partyless Oold leasure Cutagonal Res | W. atsorier postals ask in my name that w), I do If to shan are anything the my name I will do it a light 14 ? Prove to yourself that prayer can be effective

Then thou sha make the way prosperous and then thou start have good success. | Jun 10 11 Brid One Dollar for this New Prayer today Carl Oscar, Box \$20 Chicago 90 III.

ADMINISTRATIVE potential? Write Yoestional Testing Center, 2227 Delanoty

ZAN FRANCISCO-Your address, mail forwarded outgoing letters remailed, 43. Mo. THE Co. 742, Market St., S. P.

INTERESTING Mails"-25c keeps your mail box full three months. Bents, Desk-D 91 Cratana M canasput

SAVE your Hair Registered Pharmacist offers time tested formula. Checks failing hair dendruff scalp lich. Details write fit return and Ladson Pittaburgh & Pa.

PRINT without a printing press' But Profile Boy page 41

INCREDIBLE: Unprecedented! Become a mental superman overnight; Floor every-body! No studying! 'Memoprop' does all does all your thinking! It's uncanny! Revolution-ary! Write Bijou Box 1727-VG, Hollywood 30. California.

MEXICAN Law General Fractice Attorney 1301 Arizona Street, El Paso, Texas.

PERMONAL problems analyzed; correspondence or conference Please Atticipate delay, August Cesare, Box 755, Youngs-

INFORMATION for single people by Kuman Reintions Consultant, Dr. H. Long Box 375. Los Angeles \$3, Calif

SUCCESS Simplified: Become a financial wizard: a mental giant, an athletic Sqperman, a romantic magnet, an expert in any field! Pres literature, Success Bociety of America, Box 5852, Cleveland 1, Ohio

SECRET of Permation, \$1 00. Dubois.

KNOCK Out that everhang, No drugs. Quick pick up No after effects, Inexpensive. Formula \$1.00. C. G. Blair, 2330 Lumpkin Rd. Augusta. Georgia

Stop Sporing Scientifically B. Hamil-ton's Easy Way Booklet \$1 00. Box 500, Kentenia Wannens

OPPORTUNITY extraordinary for himited number physically-handicapped peuple to receive extra income for it e quest free factual brochure "Winning Prot-JaJ' Chrestell 28 Kalland City 3 Mo-

MANJEACTURER to you sixteen vitathics and ten minerals in one tablet reto he hire'sen & very your cost five dol-lars hundred W. H. Laboratories 616 H. La Peer Dr. Los Angeles 48, Cauff

"HOW to Regain Health With Proper Food Courses" Joseph Piantanida, 2126 Van Ness Ave. San Francisco & Calif.

CONFIDENTIAL Intermetion for single perman Copyrighted internture explains tutu e happiness. Melled Free upon re-quest, Strone Box 157-PS, New York 11.

Fil E5: Tormented with the Irritation due to piles? super ant information Mutal Products,

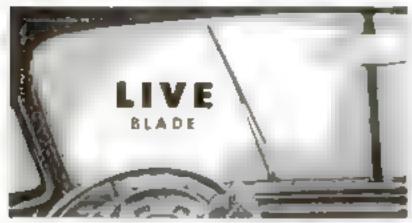
REJUVENATION self toning method Must for men. Revelation. Alfaffa. 2606-F University Place, Washington, D C

POR as little as \$8 00 you can put your ad here in the December uses Ciet in on the three mas man erder fush and debrer your sales to hid set to the 1962 000 readers of Popmar Science Specia classification. Christmas Offis -available for this issue. Same low rate you've always paul -300 a word. The December Issue closes on October 25th! Write under for order blank and true booklet. How To Make Money Out of Classified Advertising O K Kelly Classified Advertising Manager Popular Science Monthly Dept. B. 353 Fourth Avenue, New York to New York,

DEAD BLADES MAKE DEAD DRIVERS



THIS DEAD WIPER BLADE still may look okay but it atreaks glass dangerously. DEAD blades make DEAD drivers!



THIS LIVE ANCO BLADE wipes clean . clears rain . . . clears muck . . . lets you SEE. Protects you and your loved ones from gmanhupit.

Get Live New ANCO Blades ... Fit Your Car Quickly ... At More than 260,000 Service Stations

Even the best wiper rubber goes dead . . . from exposure . . . often in six months or less. Don't be a Dead Blade Driver, Don't risk facing criminal negligence charges, after a needless storm-bred smashup, with dead blades found on your car.

Come Clean! Replace at once your Dead wiper blades with LIVE new ANCO Blades. They are best for most miles of quicker, cleaner wiping. Get yours today.

ANCO RAIN-MASTER model for Flat windshields. Fits all cars. World's largest selling replacement blade.

ANCO CLEAR-FLEX model for Flat or Curved windshields. Fits all cars having Curved windshields . . . best for Flat windshields, too.

THE ANDERSON COMPANY Gary, Indiana, U.S.A.

PORTABLE GARAGE



Goes wherever Pour car goes . Tokes little room snow, dust, salt air, sun er sieet oway & prefects your cars finish

 Durably constructed of clear transporent—heavy gauge vinyl plastic that is long wearing and sough * Spring-tite electicized bottom, holds securely in all kinds of woother . Fits all makes and models . Direct from manufacturer . \$10.95 . 10 Day Manny Back Guarantee.

Enclose check or money order, or sent C O.D.

DOMAR SALES CO., 480 LEXINGTON AVE., DEPT. OP-4-New York 17, N. Y.

Build your own JET ENGINE!



Send for Complete

New Catalogue 250

Order these plans today

1. JET PHOPELLED BY YCLIC, Assemble pour non Photo and instructions of 100, 2 HOW TO MAKE EXPERIMENTAL JET 150; INTO MAKE EXPENSION AND MONEY OF ONE post of 150 land 150 to 0 to 150 land 15 age Get other taformation too. Hugh Order

J. HOUSTON MAUPIN, Dept. 66, Tipp City, Ohio

Condensation MINIATURES 1"to 108"

Three are the same official scale moders used in recognition

> and pre-combat frashing by our government

COMET METAL PRODUCTS CO., INC. Richmond HIII 18, N. Y



CLEAR-TONE LIME - MOISE **ELIMINATOR**



SIMPLY PLUG Radio or Appliance core

to Fill Fig. 12 many distracting nutsers. Solid No. Stoney pay postman \$1.28 can be \$2.60 ft. 5 days makes he had for any distracting nutsers. Solid No. Stoney pay postman \$1.28 can be \$2.60 ft. 5 days makes he had detailed by the fill Many handles of all after meta. Send for yours today.

MERIT SALES, Dept. T-29 4560 Shorldon Rd.

REAL LEATHER NAVY HELMET NO HOOKS, TUBES OR HOLES

Brand new bay's heighet of rich Cordovan Down cather their with shift warm fleece be achair a chin strap lideal for Types, cy cities formers hangers Chadron new them! and Gos t fill oil Small, medium large slave. Send cash chia 25% dep. pide puntage on the Money back \$2.00 ps.

GRAND-HAWTHORNE SURPLUS 1438 B. E. Brand, Doot, PS10-S1, Portland, Ore.

ROLLER RULE A STANDARD BEARING HANDY MECHANICAL PENCIL

Measures Curves and Streeght Lines. Any Shape Any Distance. Auy Surface. 1310 STUT SITE head

Inches and fractions record
accorately on Inch O Meter"
Excellent pencil ton! Order Now!
18 Day Monry Back, Guarantee!
(**O D.** (postage extra), In Casil, add 3% Bules Tad.

PENCIL SALES CO., Dopt. PS-10. Room 8, 1213 E. Ocean Bird., Long Beach, California



BUDGET LIVENG MILITARY LIVING LOCATION

RETIREMENT OR VACATION

Send today for the new free book covering ALL the above needs. State which interests you most. Schult, the "old renable" of the business, has up-to-date answers for YOU, Address Dept. 3110.



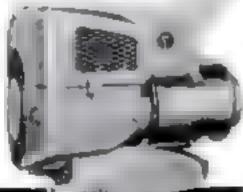
Leaders in Mobile Homes

SCHULT CORP

ELECTRICITY Anyw

FOR PORTABLE, EMERGENCY OR

ONAN Electric Plants generate 110-volt, 60 cycle overent for homes, farms, cabins and resorts beyond the highline, Lightweight, portable plants cut costs, speed work for contractors. Standby plants profed hospitals, homes, civil defense un is against power follure. 400 to 55,000 watts, Gasoline or Diesel-powered, Fricad from \$219,00.





D. W. ONAN & SONS INC.

6732 ROYALSTON AVE. # MINNEAPOUS 5, MINN

BELL RE-CORD Ofone three-speed tape recorder Madei RT-65-8 Up to four hours of recording on 7" reel

Now, everyone can enjoy all the business advantages plus entertainment-of modern tape recording, With a speed selection for any type recording this moderate priced RE-CORD-O-fone assures you of professional results for conferences, sales meetings, speech classes, and other business uses. At home, you can record radio programs or phono records you'd like to preserve, make sound tracks for home movies, or use at parties. Plugs in any AC wall receptacle, Records two tracks on standard tape . . . and tape can be "erased" and used again and again. Comes in handy carrying case, with instruction manual

ready to use! Over-all size only 15" wide, 16" long, 81/2" high. Weighs only 33 pounds

WRITE TODAY FOR BULLETIN AND PRICE

SOUND **EMSTEMS**

UND SYSTEMS, INC S64 Merien Rd., Columbus 7, Ohio

e LONG 10" BARREL FOR HIGHEST

ACCURACY 40a Sangte Shor & Repayder models!

REPEATER MECHANISM

FASTER EASIER SHOOTING

10% & Shot Repositor model? · INTERCHANGEABLE BARRELS...

SHOOT 5 TYPES OF AMMO, PELLETS,

DARTS, 88s On Sportster models At Your Dealer Or Write For Booklet

WY INCOME ARMS COME 25 Lafayetta St., Bklyn. 1, N.1

AIR GUN?



alecaria.

AMAZING VALUE FLEXIBLE

FREE 10-DAY TRIAL

Once you've tried thise Adheres securely to inside of windshield Stops glare without reducing vision want to drive again with a Like looking through fine sun-glosses mulated to hiter out uttra . Eliminates driver fullque, headlight gloce No tools—No screws—No Solts—No glues

SEND NO MONEY

Just send us your name and address We ship immediately Pay Postman 1 95 plus postage, Or, send cash, check or money order, and We Pay Postage. Visors Ot all care—ony style windshield.

Appreved by

Police, Sufety Bureaus, Insurance Componies, Truck Drivers, Perfect for anyone who weets comfort and safety while driving. Recommended by Julius Youngt

ONL STOPS MEADLIGHT

on your car you d never . want to drive again withriolet and infra-red it gives you cooler riding with uniteramfort stricted vision. Rush your more TODAY Save money

on this special Mali-Order

2605 Elmhurst, Detroit 6, Mich.

it's Easy and Great fun to Build 4 This Collector's Scale Model 1906 COLUMBIA ELECTRIC!

WHEN grandmo was the drantless motorist of her day this shing, spatess car was "the vehicle of fushion." In 1906, Columbia Electrice advectised an cranks to turn, to raitles and no explosions!

IN A few leagure bourn you, too, and build this cultivities a item! It a gasy with "Off Tresers" because they are nathantle % sente models rempletely pre fabricated with ready-shaped paris, and wheels, lights, borns, reductors, str. Easy



1906 Columbia Electric Measures 61/2" in length when complete - \$2.50

to follow step-by step instructions encluded Perfect as dea and dark ornaments, can be converted into tames, etc. Matienally Engue; satisfaction guaranteed. At hebby, toy and department stores.



1911 Marwell - 12 Id

ITIO Model "T" Ford \$2 50 52.95 1707 Stanley Steamer 1904 Olds \$1.75 1911 Buick \$2.50 1903 "A" Ford \$2 50 "T" Ford 57 95 Cadillac \$2 50 1900 Packard **\$2 50** 1903 Rambler \$2 50 1902 Frank in 52 50 1910 Inter, Harvester \$2.75 19 3 Mercer Raceabout \$3.95 1904 "Old 16" Loco.

Write to us, Add 15c for postage and headling, No C.D.D.'s, please, nudson miniatures 🖳

"Originators of Antique Autos in Ministure" SCRANTON HOBBY CENTER, Bopt. 20, Screeton 14, Pa.



experience to Make Money this EASY WAY! Show friends neighbors others how to make small back years, vacuat etc. and tray plots produce bushess of luncious, taste-tempting feuit— Apples. Pears Plums, Peaches Cherries Bernes, etc -- and cut food costs to the none. Take orders for hardy new, Quick Searing Stark Pruit Trees. Sen-ational L. S. Patent Leaders bring may orders pay you righ rewards in extra each profits. Added income with beautiful Stark Ornamentals, Roses, Shruba to home owners Enormous demand for attractive landscap og Stark Bro s a argest and oldest nursery in the world, Join the leader



STARK BRO'S Dept. 2002.

Dept. 2503, Louisiana, Missouri

Rush PREE Demonstration Sales Ootfit. Include your new 1952 Stark Colorphoto Catalog -showing Stark Front, Berries, Organicatals.

PSM 10-51 NAME ADDRESS COUNTY

TOWN ____STATE ___

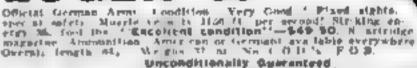
CKAGED BOAT KITS ARGEST CATALOG EVER OFFERED! 15 gages -80 construction and act on photos PLUS arres sinta \$38.95 UP COMPLETE LINE - SKIFFS, OUT COARDS, RACERS, CRUISERS 23 Models? K is Sem in these and Custom Frished beats, hard-SEND 35c FOR BOAT CATALOG BOAT CATALOG PLUS booklet on beat building, \$1.00 Over 70 modern plans and full time patierns. Racing Classes cruisers inhaded outloards sall boats fly famous designers. 8 to 30 . DESIGN CATALOG 35: DESIGN CATALOG 35: DESIGN CATALOG 35:

MARINE MART-DEPT.51-BUFFALO 7, N.Y. THROWING DAGGER \$2 This MALAYAN FIGHTING KNIFE is used for self-defense, killing Fhrills, gome, target skill. A powerful. Excitement : silent, accurate weapon

Indoors - putdoors Splits I" board Learn this Sport! Easy la throw accurately with our clear matructions. Beautiful, heavyduty 10" haife Tempered steel. Tough rowhide bound handle. Fore sovenir unusual bargain. Limited quantity. Sold direct only. Send \$2

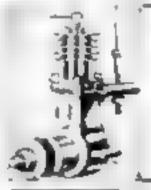
WHOLESALE IMPORT CO., Dept 7, 604 S. Morenge, Alhambra, Colif.

9 mm German Auto



Unconditionally Communiced

If not untilled column at the data for (6) or and immediate delivery in ordering you must date in the column are not a minor, as on flighter from justice or been convicted of a crime of varionce UNITED ARMS CO. 3043 \$ western Ave. Dept., PA-855, Chicago 20.



at 30 ft.

BALLINGER

TO STICE!

Our 430th Advertisement DIESEL ENGINE e for planes, bests, midget surs e 7500 RPM; 5/7 HP, 8t, 351".

wt. 5 et. e precision machined for emects operation too just can a heat (Min pr e for a heat on diene engine). Streamstand company, ray to hastil Thousands of an aned beer at gase the world. Fast delivers if our operations, and the world.

Cotham Hobby Corp. Dopt. B. 107 E. 126th St.

Make Your Appliances Completely Automatic with this

> ATTENTION HOBBYISTS! Use this motor to make your we timing attachments for your electric appliances . . . fan timer, automatic defroster, radio program

umer, photo timer, etc. Thousands of uses for this brand new Haydon Timing Motor, 1-rev. per hour, L. H. rota-

tion, 110 volt, 60-cycle, 3 watts. MONEY BACK GUARANTEE! Order roday' \$3 postpaid. May-Cone Co., 911 Franklin, Dupt PS-1510, St. Lovis 1, Ma-

DWARF

FRUIT TREES

ideal for backyard and vacant, interchants or enchants one in a chart one in a chart of full years one in the interchants of full size fruit from each teas. Then ap to Firewall mining for an plot Sell every where make messay!

GIVE THESE FOR CRRISTMAS AIR PISTOL

Straight shooting hard-hitting larger piscol that tooks and he'ts like an army 45. Wonderful for the woods or sumpus room. Hakes any ha ement of yard a target rings Ca her 177 shoots RB's dayle, and peolets. Maxim loads, cooks the rest wearon. Complete with assortment of at maint in Guarra ed. Sharpen your eye and amake your friends. Payment \$5.95.

EXTRA AMMO AVAILABLE:

Darts, Doz. 50ez 88's, 150 15ej Pollets, 500 \$1.50



GIANT BALLOONS

Neuprene Surpras Gort Weather Interest But tours. Terrafic at entire set terra for Ludges. Claye harms. School Puter Sono. Conventions. Exhabit sons. France shows Advertise just appeal events in the Rulywood fanner. Make any included a success first back yord fun Materians for parties dances face, pleases, als festivities

Dia. 39c 6 Ft. Dia. 79c 13 Ft. Dia. \$1,39



SPRINGFIELD

With modified Figle! Brig. Genuine Army Surplus rifle stocks. New, untreated straight grained, solol walnut free of cosmolene Al morfeet No warpage A \$40 vacue You il never find a se er burga n,

fection, Army Surplus Army farm as at the Springhetd Strength annoy 41.25 Paratriage Carbine 25.5. Attacked distributed Strength and Strength an

Limited Supply Other Rifle Stacks, Some Quality & Per-

Dept. S-1051, 3930 Sunset Blvd., Los Angeles 29, Colif.



New popular If our Plus blooks thoubig actual photos or color and floor plane) of over the copular tires and excee of house Working drap age material is specifications available AT TAIN COMT Order your book toler for each glass

Choice Selected Humes Over 75 designs 32 in color Manch and Suburban . BGc 158 designs, town and country

Sein Seein Preiseld \$1.00 2 to 4 herb. room allers

America & Proncer Res dential Plan Service

L. F. GARLINGHOUSE CO., INC., Box

LAWN ORNAMENT-NOVELTY PATTERNS 28 Jawn Urhanette Patterns, 25c Other 15-20" high: Dutch Otri Dutch Soy Pirate rior Mexican Girl Mexican Soy Dwarf Flower Girl 10c such 25 Novelly Patterns 62 Full Line Patterns, 61.00 Patterns.

·FLYING DUCK Wand revo wes wings Restitute appreciate Pattern, Instructions and wing Pinion Elizabeths bears bearing, steel shaft want lust boils, nuts and washers Size Pottern and Instructions wishout kit 73r Poster Pattern State Pattern

Betington, W. Vo.

YOUR OWN FIREPLACE WITH THE



Fireplace Flicker

Flame

SEND FOR FREE DESCRIPTIVE FOLDER

ELECTRIFY

Designed to light up your fireplace with glowing likeness of burning logs. Works on a new patented principle Without any mechanical or moving parts

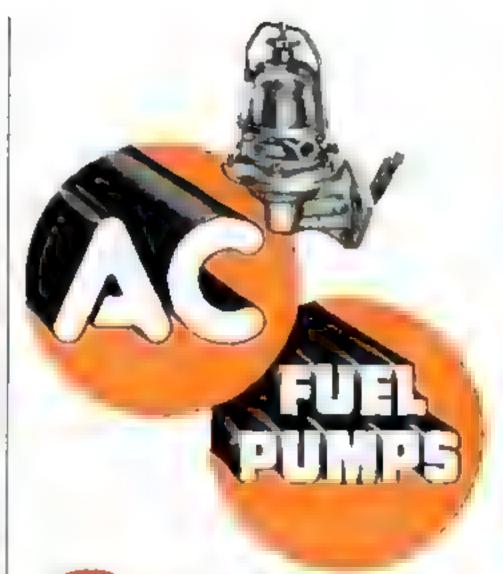
Each PIREPLACE FLICKER FLAME is equipped with \$-IL extension cord and off on switch Operates on 110V AC DC drawing less than 20 Walts without interference to radio or television reception. Can be installed by YOU in any imitation or real fireplace Can produce POUR different lighting effects

Money Back Gunrantee in 10 Days 3-Lite Deluxe Model-42.50 Postpaid Send Check or Money Order New to

P C. Bex 468

CON CORD COMPANY

Caldwell, N. J.



THE Fuel Pumps

There Are NONEBetter

More than 40,000,000 in use.

More than 100,000,000 built.

Backed by 24 years of "know-how."

America's First and Finest FUEL PUMPS

5 P A R K PLUG DIVISION CORPORATION







Fabulous Money-Rest Fun' Grow genuine live dwarf (Ming) trees. A terrific new business and hobby. Autounding details Free Write —

DWARF TREES, Dept. 12 P. O. don 353 - Briggs Station Los Angeles 48. California

FOR SPORTS - FOR FUN World's Finest "EM-GE"

BLANK PISTOL

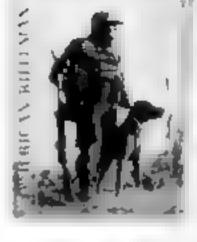
"Shoot the Warks"—safely—with this hondsome blank aistal Looks and sounds real enough for the FBI, But II can't had requiar cartridges. Six-shot magaziner safety cotch, Precision-built of carbon steel, 3½" long. A world-fomous pistar. \$10.95 excellent value of

De luxe model with pearl handle \$15.00

200 blunk cartridges \$1 58



J. L. GALEF & SON, Dep't. L-4, 85 Chambers St., N.Y.C.



GUNS WORTH \$4.00?

That's all it costs for a whole year of the AMER-ICAN RIFLEMAN, big morthly magazine seclusively about gans. You'll get a real thrill from this grand old friend, long the feverite of shooter-sportsmen. Too, you'll get prompt notice

whenever your right to own and use your gunt in sports is threatened by "anti-gun" legislation. And you can apply for membership in the National Rifle Association, with many extra benefits at an additional cost! Send only \$4.00 for an ennual subscription now . . . and gut a FREE copy of the NRA Manual HOW TO SHOOT A RIFLE (\$1 extra value), plus a confirming application for annual NRA membership.

NATIONAL RIFLE ASSOCIATION

1407-B Rhode Island Ave., N.W., Wesh. 6, D. C.



Adchen Vertreiers Esthmat Fans Attle Fints Stowers Heat Boosters \$7.93 up Drak Fans. Window Fans Blades Quards. Shutters. Motors, etc.

EDWARDS BROS ESTAR, 20 YEARS
WESTERN APPLIANCE CO., INC.
BOSO Grand River Ave., Dept P Detroit E, Mich.















AXLE ASSEMBLIES

ideal axies for farm implements, corts and trailers of all kinds

\$59.01 Less Tires F.O.B. Fectory Solid steel construction with springs and soddles— U-balts and shackles—spring balts and brackets—twos and bearings and 15" or 16" Wheels shipped complete, ready for use Dept 141

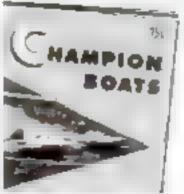
HAMMER BLOW TOOL COMPANY

Wausau Wisconsin



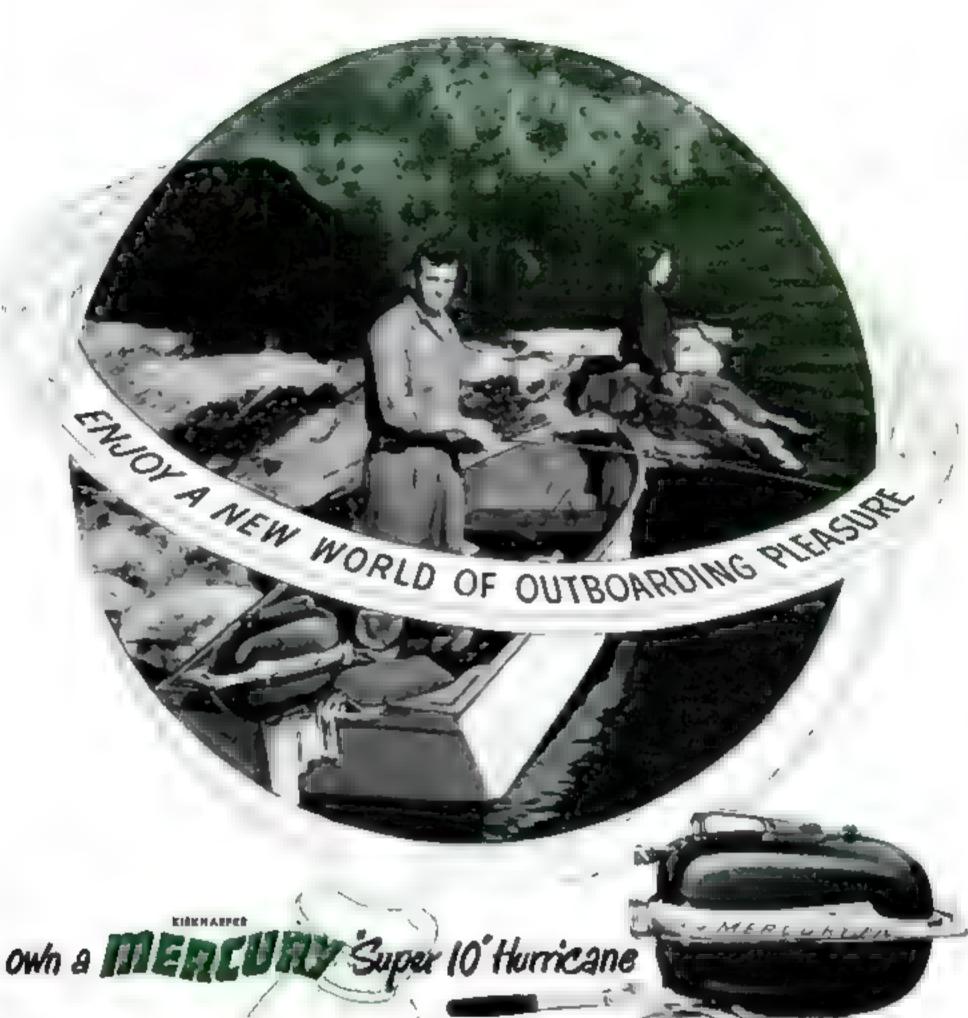
WORLD'S FASTEST BOATS!

BUILD and DRIVE your own high speed racing boat



he hundreds of others are hing! East to-folime our eluphing pines for bewest types of their Hydre-Latte se ection of full rare Hydre-planus ranging from 0 ft to 20 ft, lengths Service, fincine, Utilities, and 3 Points, Both inboard and out-boards,

SEND 25c for CATALOGUE containing pictures and descriptions of Champion Bouts for which plans are described and description exclusives. CHAMPION BOATS, P. C. Bus 1038, Dept. 18-1, Long Boach, Calstornia, L. S. A.



There's brilliance on the water in the flashing performance of a "Super 10" Hurricone. With countless speed and endurance records in its wake, this power-packed beauty of a Mercury gives you the unequalled benefits of full Jeweled Power"., plus all the other pade-setting features which have made MERCURY the favority some of authorid enthusiasts everywhere. SEE YOUR MERCURY DEALER FOR A DEMONSTRATION!

A few of the MANY FEATURES:

- Exclusive, "Hi-Rev" micro-mounted cannecting rade of drop forged chrome nickel-mely steel.
- Improved porting, Larger crankcose epening.
- High R.P.M. Waterproof Magneto for

strfe, all weather operation.

- Eight Reed Valve Cage with Veri-
- Exclusive, Drop Forged, Unbreakable Alyminum Clamp and Swivel Brackets.

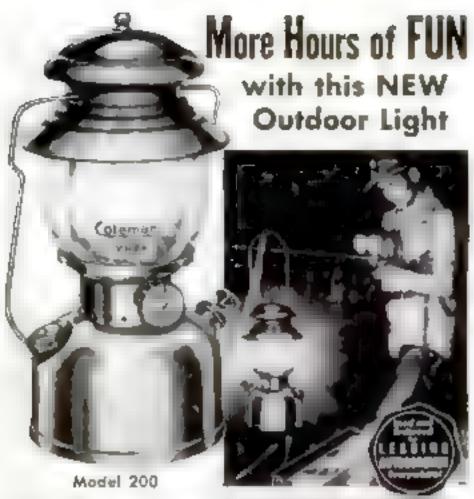
Weite for free Booklet - TPICE OF THE PILOTET





"Boll and Boller Searings Fhroughout

> Feetures of Mercury motors are protected by saved or panding paints.



FLOODLIGHT LANTERN

You can fish and hunt longer, have plenty of light on the trail or in camp at night with this great new all-purpose Coleman Floodlight Lantern. Superior in structure, appearance and service; more compact in design; sturdier built for hard use. Improved burner. Larger fuel fount (14 pints) gives 8 to 10

hours lighting service. New attractive red porcelain ventilator top. Instant lighting. Floodlights 100 ft. area. Stormproof. Safe. See it lighted-ask your dealer.

Big Outdoor Spotlight

Easily attached Coleman Reflector makes a powerful spotlight of your lantern. Concentrates a flood of brilliant light wherever wanted. Made of high luster steel, adjustable handle.



Easy Meals Quick ... More Fun FOLDING

> Cooks like a city gas range. Lights instantly, easily regulated. Folds up and carries like a suitcase. Durably built for long service. See your dealer.

MAIL COUPON TO	The Coleman Co., Inc., Dept. 562-752 Wichite 2, Kans.
Please send me free I Camp Stoves and othe NAME	iterature about Coleman Lunterns, or Coleman Appeances.
ADDRESS	





you try to a your own home for me manth BIG HONCH POB TESTING. Prove it pays for Realf by W 2 24 MFO CO. 361 M Main, Mitchell, S. Dak.

HIGH POWER TELESCOPES

40 Pewer-apent to 36 Inches. Procision & Polithod Lenses, Ideal for Studying Stars, Plane Spotting or Interesting Pleasures Satisfaction Quaranteed or Mency Helunded Bend Check or Mency Order to

CRITERION CO., Dept. PS10, 436 Asylum St., Hartford 3, Conn.



For Seven Hundred Fifty Dollars and 30 days of your spare time, you can build yourself this Beautiful Home. In the reason two Point tools to one to the hard to the Point to the terminal tools to be of the tools and the tools are the too e - Buenetst & Material Task

H FARROW Dept. D. Calumbus 18 Ohio



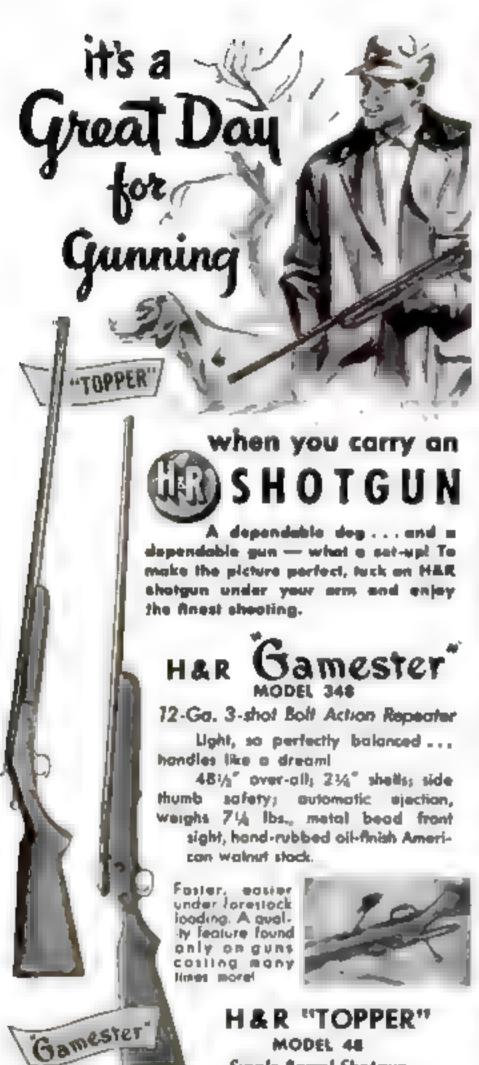
Proudest man in motorcycling!

He owns the world's greatest motorcycle

1952 HARLEY-DAVIDSON #YDRA-GLIDE



DEALERS WANTED: A few franchises available for the full line of famous Big Twins and the 125 Model, Write today,



Single Barrel Shotgun

The world's largest selling single barrel shotgun! Smooth action, trim lines plus a reputation for never shooting loose.

Available in 12, 16, 20 and .410 gauges. Hammer with coll spring action. Weighs 5 to 61/2 pounds. Handrubbed oil-finish American walnut stock.

See these H&R shotguns at your gun dealer's.

FREE CATALOG on all HAIL this sporting symp. Write today.

HARRINGTON & RICHARDSON ARMS CO.

108 Park Avenue, Warcester 2, Mass.

Executive Sales Offices

Consider Subsidiary

investment Building Washington, D. C.

HAR ARMS CO., Ltd. Drummondville, Guebat

QUALITY ARMS FAMOUS THE WORLD OVER







LIGHTWEIGHT

9 5 bp. 4-cycls. 3 speed Foot shift. Over 70 miles per gal. Over 60 m p h Write for from circular

MUSTANG, Dopt. PS 635 W. Cutorado Glendate 4. Calit.

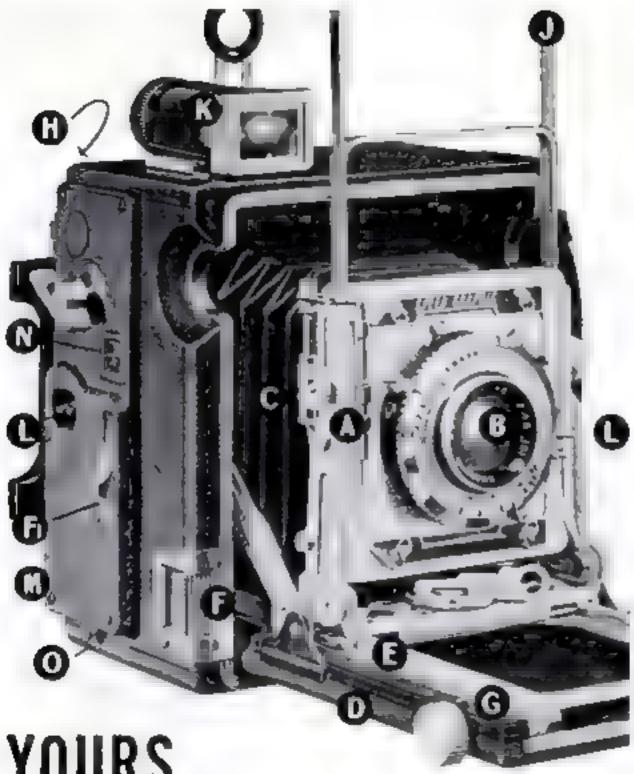


SEND FOR NEW GIANT BOOK ON ELECTRIC TRAINS -48 big pages. Over 100 color pictures. Shows and describes new American Flyer Trains with sensational

Air Chime Whistle—the world's only scale model trains with 2-roil track, smoke and "choo-choo" sounds. Talking Railroad Station and other spectocular equipment, Send 70c to Gilbert Hall of Science, 248 Erector Square,

New Hoven, Conn.





YOURS...
FOR BETTER PICTURES!

You must handle a Graphic to realize all its advantages. Though packed with every feature a professional could need, the Graphic can be used with all the ease and speed of an ordinary folding camera. That's one reason why America's press cameramen use them . . . and why you'll make better pictures with your Graphic too! THE SPEED GRAPHIC. As illustrated, 2½ × 3½, 3½ × 4½; or 4 × 5. THE CROWN GRAPHIC. Identical to the Speed Graphic except for focal plane shutter. Lower in price.

THE CENTURY GRAPHIC. Lowest-priced, yet with many Graphic features . . . including ground glass focus; built-in flash sync.; Grafick back; costed f/4.5 lens. 2½ x 3½ . . . only \$109.50. Prices subject to change.

ACCESSORIES TO KEEP PACE WITH YOUR SKILL!









GRAFLEX
Prize-Winning Cameras

- A. CONTORTIONIST FRONT, For corrected perspective whenever you want it. Simple controls raise or lower the leng shift it sideways, or tilt,
- B. INTERCHANGEABLE LENSES. A flip of the slide locks and your lens is ready to be replaced with a portrait, wide-angle, telephoto or other accessory lenses.
- C. DOUBLE EXTENSION BELLOWS, For extreme close-ups. Permits full-size copy with standard lens. Invaluable too, when using special lenses.
- D. OROP SED. Helps correct perspective in conjunction with tilting lens board . . . and for use with wide-angle lenses. Bed remains linked to focusing knobs.
- E. FOLDING INFINITY STOPS. Bring the front into exact calibration with Vernier focusing scale and squared with film plane, Stops fold back, allowing front to move farther forward. Additional sets of stops can be installed for use with different lenses.
- F. RODY SHUTTER RELEASE. Set right in the camera body for extra stability at the instant of exposure. (f.i.) Speed Graphic has selector control too, for instant choice of shutters operable by the same release.

MULTIPLE FOCUSING CHOICE, Use one, or use them together, they guarantee ranor-sharp focus! 6. The accurate Vernier type focusing scale on camera bed. . H. Ground glass focus through the lem... and the coupled Kalart range-finder toptional). MULTIPLE VIEW-ING CHOICE. J. Folding open frame viewfinder with parallax correction... K. Tubular optical viewfinder with parallax correction (optional on Century Graphic) and the ground glass screen.

L. BUILT-IN FLASH SYNCHRONIZA-

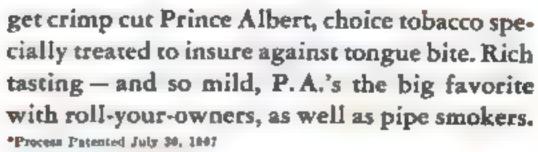
- M. GRAFLOK SACK. Designed to take such valuable accessories as 120 Holl Holder, Graffarger and Graffantle Film Holder.
- N. DIRECT READING FOCAL PLANE SHUTTER SPEEDS, No tables to consult, No calculations.
- O. GOVERNOR SELECTOR. Doubles or haives exposure with flick of finger. Insures optimum accuracy of shutter.

Grafies, Inc., Dept. 107 Rochester S, N. Y. Please send details on :-
Speed Graphic Crown Graphic Century Graphic Roll Holder Grafmatic Grafite Flash
Street
CityZoneState



Whether you smoke a pipe

or roll your own . . .



More Men Smoke



than any other tobacco

Popular Science Highlights

This Month



When the hird is on the wing, hunters werry about their sim, not the performance of their shedgen shells. They're sure-fire—thanks to a mass-production miracle that combines 212 manufacturing operations to turn out 1,866.000 shells a day from one plant. Page 176



Used power tools can be good buys for your home workshop—-IF you know what to look for and to look out for. Mere's how to tell the bargeiss from the busts.

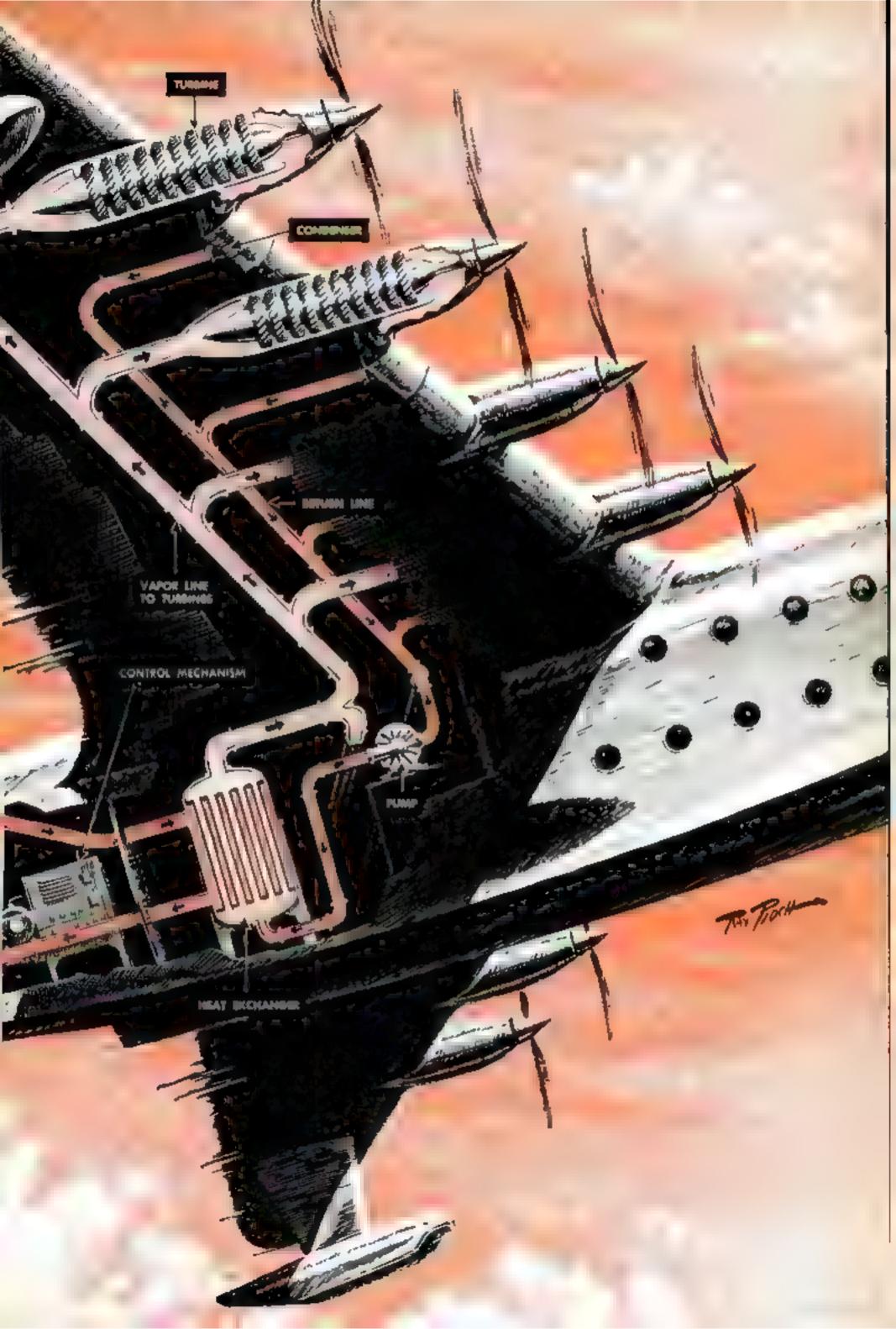
Page 201



The Russian limensine above, a Zis-110, was captured in Koren and sent home to Gen. Walton Walker's widow. It will be on display at the Motorama in Los Angeles next month. You'll find a lot more about Russian cars—the Moskvich, the Pobeda and the rest of the Red auto line—in this issue. Page 196







can go to the other side of the earth and back again, or all the way around, without refueling, is needed now. And the time when atomic power will be used to extend the range of aircraft tremendously is drawing closer. A carefully worded report by the U.S. Atomic Energy Commission on progress in the first six months of 1951 makes this terse but significant announcement: "Development of reactors to propel military aircraft also advanced."

Squeesing a Pile in a Plane

Yet the first atom plane is unlikely to be either a long-range bomber or a transport plane. Instead, it will be a flying laboratory for the armed services. The power plant probably will be so heavy that it will use up all the weight-up to 50 tons-saved by omitting fuel. Thus the great advantage of atomic power, the increase in payload made possible by the almost weightless atomic fuel, will be sacrificed. Still, the plane will have unlimited range, a big step ahead.

Eventually, perhaps within 20 years, this plane will be followed by atomic jets, ramjets and even rockets. Nuclear reactors will be developed that can pour their vast energy directly into compressors, heating airstreams to such a flame temperature that they will have the thrust of a jet. But not yet. Not enough is known now about reactors at white heat, nor about the ability of air to wipe that heat off instantaneously at jet speed, nor about metals that can stand both the high temperature and the intense radiation.

Until such problems are solved, the re-

actor used in a plane must operate at relatively low temperature. It will pass its heat to a circulating liquid metal that will in turn pass the heat on to a heat-exchange unit. There a working fluid-mercury or waterwill be vaporized to drive a turbine. Then the working fluid will be cooled in a condenser and pumped back to the heat exchanger. All this adds up to plenty of weight.

The reactor itself need not be big. Half an ounce of fissionable uranium (the kind that splits) or plutonium can furnish as much energy as the entire 17,000 gallons of fuel carried by the B-47 Stratojet. Less than a pound would be used up in a 50-hour flight around the globe. But neither fissionable uranium nor plutonium can be used in pure form.

The bulk of the first reactor put into an airplane probably will be ordinary, nonfissionable uranium. This will be enriched with fissionable uranium 235 to permit the chain reaction. Graphite blocks or some other "moderator" will be needed, too, to slow down the fast neutrons and keep the "fire" burning. The generation of power may be controlled by cadmium rods, pulled out of the reactor when power and speed are wanted, pushed in to absorb the neutrons and "bank the fire" for slowed-down flight or landing. So the reactor alone will probably account for several hundred pounds.

Must Protect Crese

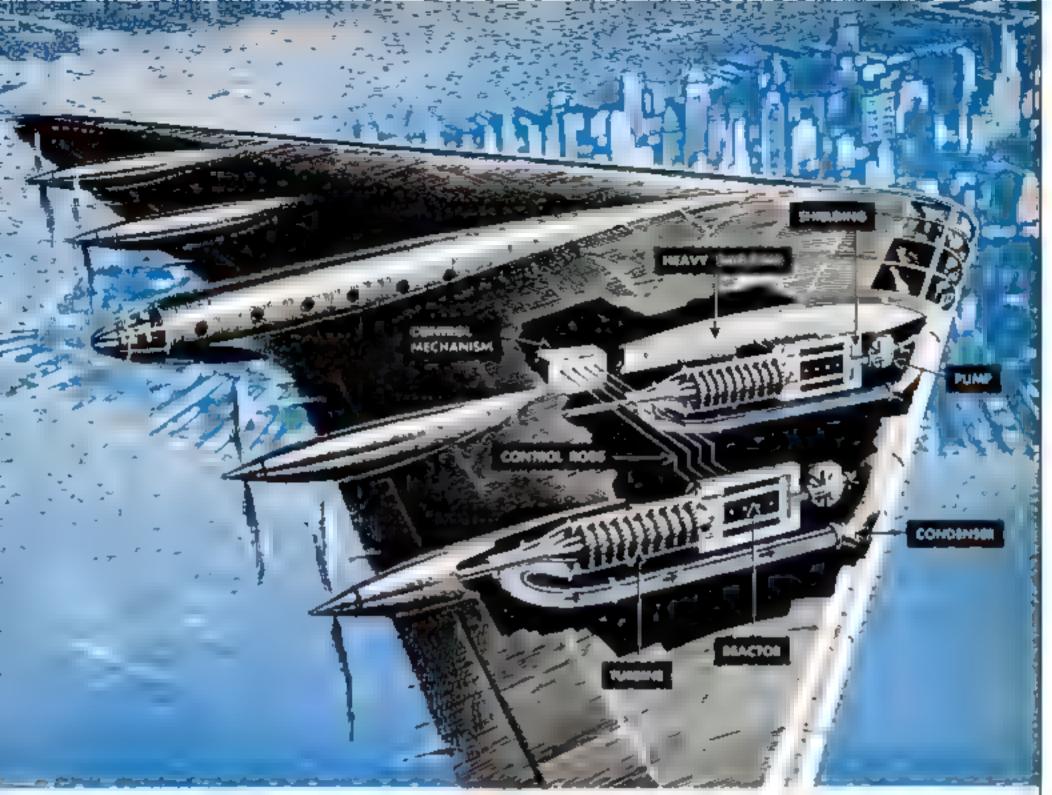
But the reactor only provides the heat. Transmitting the heat to the turbines will involve more equipment-and more weight.

It will not be possible to take the heat

Big flying boat is best bet for first atomic aircraft because of great size and long take-off run needed to lift heavily shielded reactor. It

might be similar to world's largest plane, below, Howard Hughes' 219-ft. Hercules, which has four engines in each 160-ft. wing,





Future model could be a flying wing with separate reactor coupled directly to each turbine.

Its design awaits development of materials able to withstand high heat and radiation.

from a reactor of the type now in use directly into the working fluid of turbines because of the enormous neutron and gamma-ray activity within the reactor. The working fluid which circulates through the plane to the engines in the wings must be protected from that bombardment or it will become radioactive and endanger the crew. But a heat-transfer fluid can be interposed, probably a low-melting alloy of sodium and potassium. This would circulate through the reactor to pick up the heat and deliver it to a heat exchanger where it, in turn, would heat the actual fluid used to operate the turbines.

Shielding Adds Weight

A reactor and heat exchanger of this type would be "hot" with radiation as well as in temperature, but might not pass the radio-activity on to the working fluid. Still, they would have to be encased in heavy and bulky shielding—probably lead—to stop the radiations from penetrating the plane.

From the heat exchanger in the shielded section, high-pressure vapor lines might

carry the steam to six or eight turbines—one for each propeller—mounted in nacelles in the wings.

There the energy of atomic fission would be finally delivered and converted into motion. No shielding would be necessary, but the loss of temperature and pressure through the long lines would be a disadvantage.

This loss can be eliminated only when it becomes possible to provide each turbine with its own reactor, mounted alongside it in the wing.

Atomic Warm-Up Takes Time

There also are other problems. The molten metal used as the primary heat-exchange liquid would solidify as it cooled when the reactor was shut down. The first step in bringing the plane to life would be to liquely the metal with auxiliary heat, probably from a small gas turbine. Furthermore the metal would not be allowed to solidify throughout the system, but would have to be drained from the reactor, the heat exchanger and piping. In fact, the whole system would have to be purged of the liquid

metal, probably with hot helium gas (which does not react even with the molten alloy of sodium and potassium),

System Requires Automatic Control

Obviously such a power system would be sensitive and complicated to operate. It could not be done by hand. The energy level of the nuclear reactor would depend on the position of the cadmium control rods. They would have to be precisely adjusted for every phase of take-off, flight and landing.

The engines might be sluggish in their response to controls, for a change in the neutron release would first be converted to temperature in the reactor and, with so massive a power system, it would take quite a bit of time to translate that

temperature into pressure on the turbines.

Automatic control by instruments that know what is going on within the heavily shielded power system would probably be used. Servomechanisms might be connected to electronic instruments that constantly measure the neutron flux within the reactor.

The delay in reaching full power would be a handicap on the take-off, when maximum power is most needed, and the plane would require a long runway-long enough,

perhaps, to indicate a flying boat for the first experimental model. Booster rockets would help, but the take-off distance would still be great.

Once the great plane is airborne, however, it should operate smoothly and quietly

at the highest speeds propellers can bite out the temperature and expansion to give the of the air. And it should stay aloft for days.

First Flight Possible by 1960

Such a plane could be in operation by 1960. Since 1945 the NEPA Division (Nuclear Energy for the Propulsion of Aircraft) of the Fairchild Engine and Airplane Corporation has been at work on it under contract with the Air Force. Last February the Atomic Energy Commission announced that Fairchild had "completed its contract." This presumably meant that the feasibility of a

nuclear airplane engine had been demonstrated.

Since then General Electric has said that its jet center at Lockland, Ohio, has started on an Air Force-AEC project for the "further development of an atom-powered engine for airplanes." The Air Force has made additional space available to the project in the huge World War II piston-engine plant at Lockland.

And this fall the Air Force awarded the contract for actual development of the

> atom plane to Consolidated Vultee Aircraft Com., the firm that builds the giant B-36. The statement gave no other details. These official announcements can only mean that such a plane is

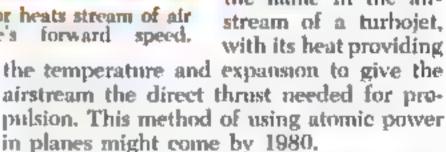
very close to reality. Aemally, this pio-

neer plane will soon be obsolete. With reactor research work getting into full swing at Arco, Idaho, and at The Knolls at Schenectady, N. Y., it should soon be possible to use a "fast reactor" in place of the slowneutron model. This may be so much smaller that it can be set into the wing.

Atomic Jets Forecast for 1980

Whether the heat exchanger and the enclosed system of circulating molten metal

> can be eliminated depends on many unknown factors. But certainly the objective will be to heat air directly in the reactor. Ideally the hot reactor would merely replace the flame in the air-



When it does, the nuclear engine should weigh but little more than present engines. Then, most of the tounage saved by omitting gas tanks and gasoline can be used for payload. Doubling or tripling the payload will cut the cost per pound of air transportation to one-half or one-third of present costs of operation. And the new era in aviation will be here.



Atomie turbojet: Reactor replaces combus-

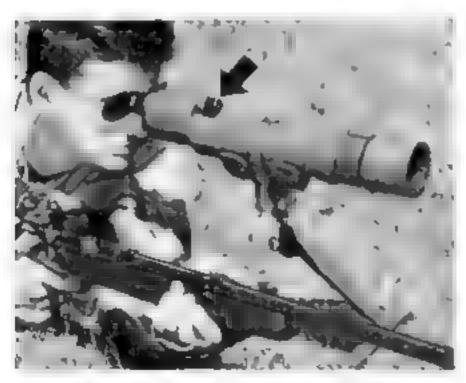
tion chamber to best air from compressor.

Atomic ranifett Reactor heats stream of air compressed by plane's forward speed.



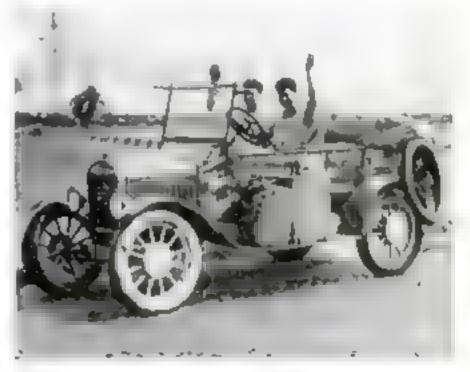
Tug Ducks Under Bridges

Low bridges don't bother this new tugboat—it just pulls in its pilot house. When approaching a span that's too low, the helmsman pulls a lever, and a pneumatically controlled hydraulic lift lowers the pilot house to deck level, as shown in inset. At the same time, the two masts fold over on hinges. After passing under, up come the pilot house and masts again. The 89-foot, 12,000-hp., General Motors Diesel vessel, designed for inland waterways, was built for the Blue Line of N. Y., by the Levingston Shipyard, of Orange, Texas.



Moving Prism Focuses 'Scope

THE Bausch and Lomb 60-mm, target-spotting telescope above uses a new method of focusing in which the instrument's prism moves, instead of the eve lenses. The focusing knob (arrow) is located for easy operation with the index finger. Greater speed and accuracy of focusing is said to result. Weighing 48 ounces, the new scope is available in four magnifications: 15, 20, 30, 60.



Model T Rolls on Straw

Unable to buy replacements for the worn-out inner tubes in the tires of their Model T Ford, these two Norwegian students came up with an ingenious solution: They threw away the tubes—and stuffed the casings with straw. How well it works is shown in this picture of them touring Western Germany on their way home from the Paris 2,000th anniversary celebration.

TV Keeps an Eye on Smoke

TELEVISION is helping New York Leut down its smoke nuisance. Three huge stacks of the Consolidated Edison Company's Waterside generating station located near the heart of metropolitan New York, can belch a lot of smoke if the boilers are not regulated properly To keep their sooty output under control the stacks are constantly televised. In the boiler control room deep underground an operator watches a video viewing screen and makes adjustments as the picture calls his attention to any abnormal smoke conditions. The company also uses its own television setup to monitor the water level in drums located 90 feet above the control room. In this case, the televised image is a water gauge.



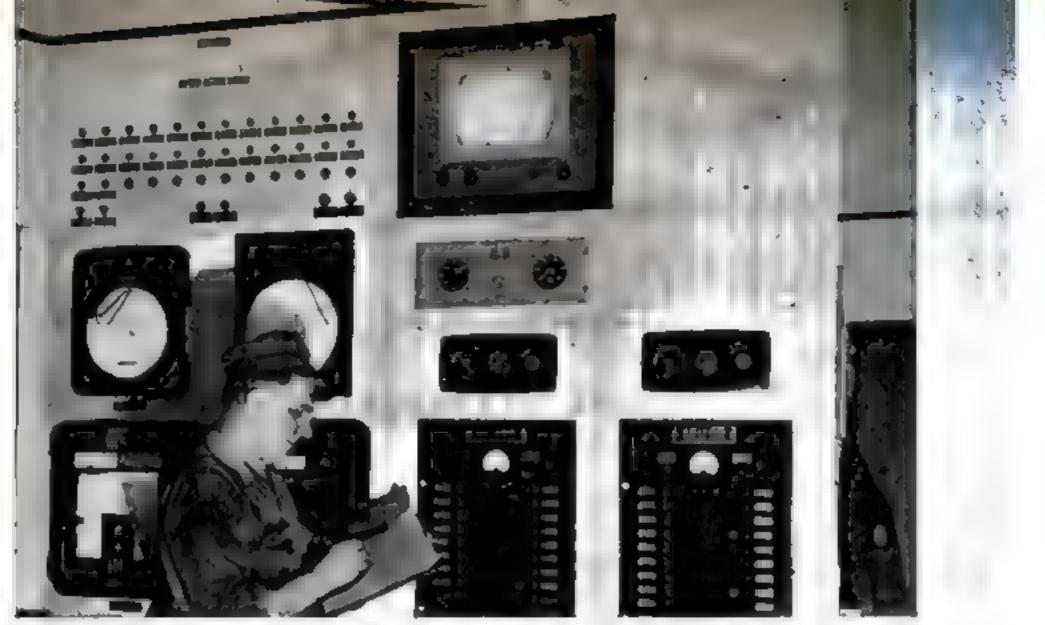
TV contern (at window in background) and increase are in building four blocks from stacks

400-M.P.H. Super Connie Tries Its Wings

STRETCHING its 123-foot wingspread over Southern California mountains the new Locklerd Super Connic is shown in its first flight photo below. Its builders added 18 feet, 5 me as to its tus lege for a total of 113 feet. 7 meles (125 Jan. 51 p. 150). The new Censtellat in its the only U.S. transport hunts so that it can be fitted with it.

creasingly powerful engines, from the latest reciprocating types to ges trabines driving propellies. Passenger version can accommodate from 47 to 93 persons, depending on scatting plan in travetype will sent up to 11st. Added strength has been built into the new trangent prince to take turbe properties in excess of 4 traps.





Viewing screen, connected to camera by coaxial cable, is located in boiler room 450 feet below top of stacks. By watching smoke output, operator can adjust boiler.

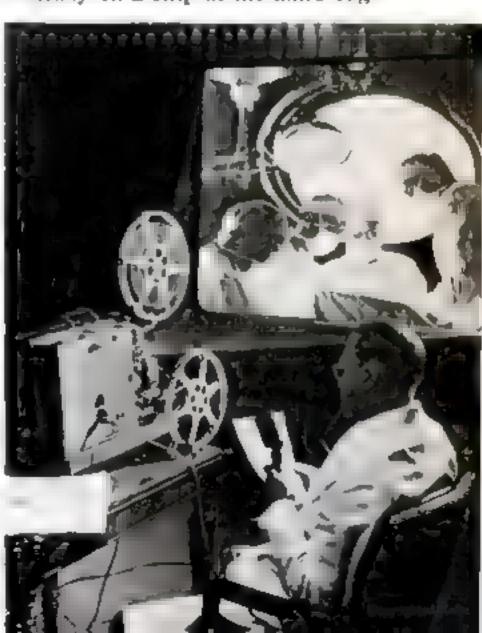
Radar to Scan French Harbor

This 40-foot-wide antenna is part of a U. S.-built radar system for the Port of Le Havre, France. Even in a 90-m p.h. wind, it will make eight revolutions a minute, detecting any object of consequence in the harbor. When tested in Boston recently, scope operators picked up a 10-inch lobsterpot float that was two miles away.

Projector Records Sound, Too

THE new 16-mm, movie projector below can record sound on film as it projects it. With this setup, a running commentary can be added to a movie—as this doctor, describing an operation, is doing—that was originally shot without sound. Made by RCA, the apparatus records sound magnetically on a strip at the film's edge.





ALL ABOUT RUSSIAN CARS

They're hard to come by—and when Ivan gets one he faces many of the same problems Dad did with his Locomobile.

By Hartley E. Howe

NEXT time a foreign-car hot-shot starts telling you about the new Javelin Jupiter or how many kilos he knocked off in a Lancia, just ask him what he thinks of the Pobeda (pronounced po-bee-veh-da). Or how about the riding qualities of the Zim?

You've got him—unless he's been peeking behind the Iron Curtain—because these are Russian cars. This advertisement ran in The New York Times for nine days without bringing a single Russian car to light:



But next month, one will be exhibited at the Los Angeles Motorama. It was captured in Korea.

And the Russians recently have started exporting ears to some countries—apparently to secure foreign exchange.

One of the few Russian cars to be allowed abroad is the Moskvich, which means Son of Moscow. It is an adopted son, however, for the Moskvich is almost identical with the German Opel Cadet of 1939. And so it should be: Opel machinery was shipped from Germany to Moscow as war reparations. Russian autos in general are about nine years behind their Western equivalents—a lag partly due to World War II and partly to the problems faced by the Soviet auto industry.



COMMISSAR'S CAR

The Moskvich, a four-seater, has a 102-inch wheelbase and is between a Crosley and a Willys in size. Two reporters from the British magazine Motor took a Moskvich four-door sedan out on a test spin. They reported that: "a modern single dry-plate clutch gives a naturally smooth getaway. Acceleration with a three-up load was adequate but not exciting on the partially run-in car we drove . . . The gears are all quiet, including reverse, middle ratio being useful up to 30 m.p.h. and allowing almost 40 m.p.h. to be attained . . ."

Maskvich Does Well on Bumps

Its lightly damped, soft springs, they added, make "riding over bad surfaces . . . quite commendably free from shock, even for a rear-seat passenger. On sharp corners body roll can be induced but the car does not feel unstable."

Both the worm-and-wheel steering and the hydraulic brakes are quite unusually lacking in "feel," they reported, its "reasonably taut steering requiring conscious attention if the car is not to wander slightly on straight roads."

Criticism from Russian buyers about the quality of the Moskvich has been reported from Moscow, but *Motor* was critical only of the roughness of some of the body panels. The paint job was said to be good.

The car has an interior light, a glove compartment, ventilators in the front win-



Zu-110 is for big shots only. Name stands for Zavod [plant] Imeni [named after] Stalin. Lhead engine turns out 140 hp. at 3,600 r.p.m.,

20 hp, less than that of 1940 Packard from which it was copied. Maximum speed is 87 m.p.h.; nuleage, 10.1 to the gallon.

dows, and dual windshield wipers driven from the engine. The instrument panel includes a fuel gauge, an oil-pressure gauge, a speedometer registering up to 120 km. an hour (about 75 m.p.h.) and a total-distance recorder. The luggage compartment is reached by pulling forward the back of the rear seat.

Distribution Center in Belgium

In Brussels, a major distribution center for Russian auto exports, the Moskvich costs roughly \$980. A de luxe model costs about \$200 more. These prices, say European auto experts, are below cost.

Reports from South America say Russia plans to sell the Moskvich there for even less-\$840. U.S. cars sell there for twice

their home price, so the Moskvich would cost half as much as our cheapest midget in South America; one-fourth the cheapest U.S. full-size car.

Other Russian passenger automobiles are the Pobeda, the Zim, and the Zis-110. Smallest is the five-seater Pobeda [Victory] that looks something like an early postwar Chevrolet. The engine is an adaptation of the Continental F4140, which appeared in this country in 1938. The transmission is a modification of the 1932 Ford B.

To improve durability and maintenance, both poor on prewar cars, the Pobeda uses cylinder liners and exhaust-valve inserts. The car also has forced crankcase ventilation, force-splash lubrication and a conventional by-pass oil-filter system. The

NEWEST MODEL

Zini-or "works named after Molotov"—is latest USSR car, aims to provide luxury at lower cost than Zis. Sixcylinder engine is rated at 95 hp. at 3,600 r.p.m., provides a top speed of about 80 m.p.h., gets about 12.5 miles to the gallon. Windshield wipers are electric. It's equipped with radio and heater. The Zim is manufactured at the Molotov plant in Gorki.





FAMILY CAR

Poheda [Victory] comes as five-passenger sedan or cabriolet. Four-cylinder engine develops 50 hp. at 3,600 r.p.m., provides 68-m p h. top speed, gets 19.5-23 miles to the gallon, Car weighs 2,926 lb., has a 106-inch wheelbase. Its heater is important item in Russian winter.

wheels are suspended independently; brakes are hydraulic.

The next larger Russian car, closely resembling a Buick in appearance, is also the newest, the six-passenger Zim. It is described by the Russians themselves as fast, highly maneuverable and with good road qualities. Other characteristics include independent front-wheel suspension with helical springs, and fluid drive.

Russian Zis Resembles Packard

The fourth Soviet passenger auto, the biggest, is available only to top-drawer commissars. Called the Zis-110, it is an adaptation of the Packard Custom Super Eight 1808, the 1940 model, but minimum tolerances are reported to be .002 to .004 inches, noticeably larger than the Packard's. It

carries seven passengers, and also comes as a touring car. The windows have push-button controls.

How much does a Russian pay for one of these cars? Well, he probably can't buy the Zis at all; the only way he can get one is to rise in the Soviet bureaucracy until he reaches a job with a Zis built in. In 1949, the Moskvich was advertised

in Russia for 9,000 rubles and the Pobeda for 16,000. More recent reports quote the Moskvich at 8,000 and the Pobeda at 12,000. Figuring the buying power of the ruble in Russia at five cents, the last-mentioned prices would be \$400 and \$600. Using the Soviet's official exchange rate, 25 cents, however, they would be \$2,000 and \$3,000. The average monthly pay of a Soviet worker is only 620 rubles, so that it would take him 13 months' work to earn the cheapest car. However, skilled workers sometimes make five times the average rate.

American experts feel the cars are priced low in relation to other Russian huxuries—less than six times as much as a good suit, for example. Coupled with the tiny production rate, this makes them suspect that the sales price is arbitrary and that the cars are really used as rewards.

The cars are sold for eash, and it isn't easy to save up the money—all savings were sharply cut in 1947 by currency manipulation. Nevertheless no glut seems likely.

The 1950 production goal under the Third Five Year Plan was 72,000 units. We don't know if they made it, but one Soviet report gives 1950 production as 141 percent of 1949, which would make 1950 only 28,200 cars. That year the United States made 6,672,700 passenger cars. The Soviet planned to make six times as many trucks

as autos, however, while here we made five times as many cars as trucks.



There are reported to be 16 retail auto-sales agencies in the USSR-a tiny number for such a huge country. City department stores take orders, but from Russian accounts many people travel long distances to

Moscow to order an automobile at one of the beautifully decorated marble showrooms. A Moscow salesgirl, Miss Suslina, reported that her store sold 15 to 18 cars a day, and a total of more than 7,200 to individuals in the "past two years and more." That's a big chunk of the entire Russian output for that period.

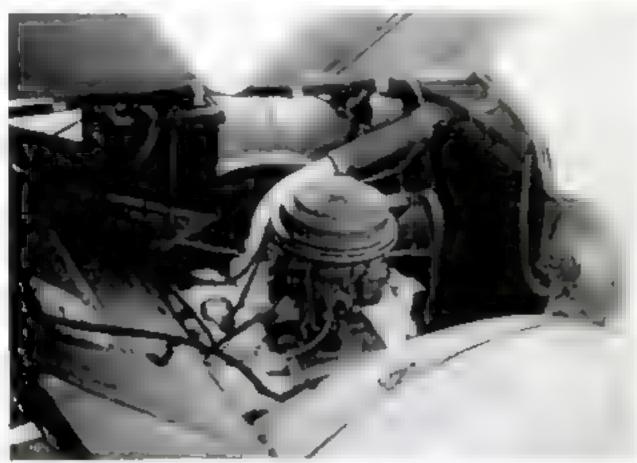
After a Soviet citizen successfully saves his money, gets the nod from the party boss, finds a salesroom and proudly drives away in his new car, he finds that his problems have only begun. He's likely to have the





MIDELE

Moskvich station wagon, above, is very popular in Russia. Car also comes as four-door sedan. Four cylinder engine, right, turns out 24 hp. at 3,400 r.p.m. to provide 45 m.p.h. cruising speed, 56 maximum. Fuel consumption is reported 30 miles to the gallon. Unsynchronized shift provides three speeds forward, plus reverse; gearshift lever and hand brake are on the floor in center. In picture at right, battery is at top left; downdraft carburetor is at the right of the engine



same troubles now that your Dad did when he bought his first Locomobile.

For one thing, autos are still so rare that there is little chance to learn to drive. As one man wrote to Pravda: "The need to issue detailed illustrated handbooks which are comprehensively written is perfectly obvious. However, the car factories supply owners with too-brief instructions."

The same letter went on

"Owners of private vehicles have not the opportunity of obtaining the spare parts for them. The supply of car parts by post has not been organized. Cases in which because of defective spark plugs, wear and tear on the piston rings, condenser leaks, and other

minor defects, owners are deprived of the opportunity of using their cars and motor-cycles are not infrequent."

Then comes a most revealing complaint: "It is not easy to buy petrol and oil. Thus because of the lack of petrol and oil my Moskvich is off the road."

Repairs Are a Problem

The repair problem is really tough. An article in Izoestia this past winter noted that despite the increased number of car owners "nothing is being done in the district for the servicing of private cars.

"In a city as big as Stalino the repair of motor tyres is a complex problem. Before



RACING

Svezda [Star] is Soviet sports racer. This is Model III, shown with "Master of Sports" Pavel Baranov at the wheel. According to the Moscow radio in 1949, the racer weighs 900 pounds, goes 102 m.p.h. Its engine is rated at 54 horsepower. The car is made from parts of the Moskvich and the M-72 motorcycle.

last summer there was a public vulcanization workshop in one of the artels [producers' cooperatives]. Now it is closed. Car and motorcycle owners are compelled to make private arrangements for tyre repairs with workers in garages where there is vulcanization equipment.

No Service Stations

"It is the same with car repairs. There are no workshops in any of the towns in the oblast (region) prepared to accept cars . . . from citizens for repairs." Service stations have been suggested for two years, the writer adds, but there still isn't a one.

Once you've learned to drive and maintain your car in Russia, found a garage, a

mechanic, and a man to fix flats in his spare time, and discovered a place to buy gasoline, you face the problem of where to drive. There's plenty of room but few paved roads. On an 8,000-kilometer test run of the Zim, the cars crossed shallow streams and roads flooded after heavy rains. The Zims averaged 36 to 42 m.p.h. over asphalt

roads and only 24 m.p.h. on mountain roads. It's not surprising that soft springing is emphasized on all Soviet passenger autos.

Comparatively primitive conditions turn up repeatedly in the whole picture of motor transport in Russia. In Soviet auto factories production is mefficient with high overhead and low output per worker. In 1947 casting rejects ran as high as one out of every four or five. Tires frequently last only 1,000 miles: while some may go as far as 9,000, others last only 90!

Short vehicle life and high operating costs reflect this situation. In 1937 only 55 to 60

percent of the motor vehicles in the Soviet Union were in running condition at any one time, and things were reported no better in 1948. In 1947, it is estimated, it took one man 200 days' work to keep one truck running for a year.

Poor manufacturing quality isn't the only cause of these troubles-Lend-Lease trucks wore out quickly in Russia too. Bad roads and a terrific climate are partly to blame, but inadequate maintenance and poor quality gasoline and lubricants are a major cause. The Russians are struggling to overcome these handicaps. The new cars are designed for longer life with such features as winter preheating devices, removable main bearings, and fuel, air and oil filters.

> Preventative maintenance is being taught. Gasoline and lubricants are improving, although standards are still low. Difficulties in making good gasoline have led to considerable research into engines burning natural gas or liquefied butane-propane.

> Raising factory standards is a herculean job. A returned German prisoner of war who

worked in the Moskvich factory reported that "all around the machines waste is heaped, and . . . it has been left there for several days . . . The worker's mind and sense of duty are not quite as organized as you might be used to from Western plants.

Presses Overloaded

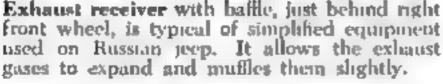
"The presses that shaped the enormous sheet-metal squares into fenders . . . parts other one day may be so overloaded that the material piles up in veritable mountains, making it impossible even to look from one station to another. A



tured in Korea, is one of two USSR passenger vehicles found in this country. It resembles U. S. jeep (right, above) in general appearance, but is more crudely made. Most of body can be shaped with simple hand tools, then roughly welded. Ribbing for strength, found all

over U. S. jeep, is kept at minimum to avoid press work. Soviet car is unreliable and less agale—ask Pfc. E. W. Street, shown at wheel, When he was cut off by a road block during ill-fated retreat from Taejon in summer of '50, Street tried to break through in abandoned enemy jeep, but it quit on him repeatedly.

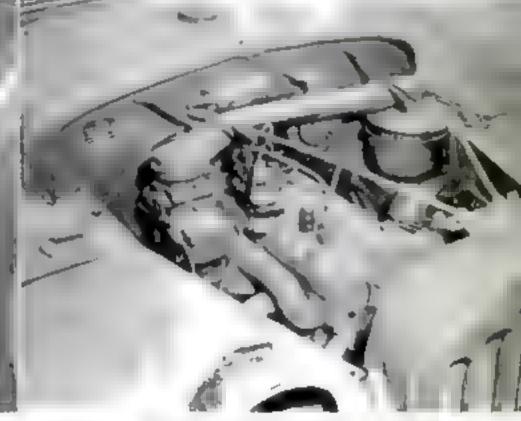




'norm' is on the way. The waste is burriedly pushed over to any open space . . . the next day workers are very busy carting away the dirt. It would be impossible to go on producing for nobody can move . . . This means that the management or the foremen must possess the gift of improvising more than in any other country . . .

"Here you have to think in the Russian way: 'Nitschevo, we will muddle through, Daddy State pays for all'."

[Continued on page 302]
OCTOBER 1951 |||



Engine in Russian jeep is similar to Fordson tractor engine, but distributor is like Mallory. It has a fuel pump. Gears are non-hypoid; front and rear axles resemble Ford Model A.

Valve under dash enables driver to change from gas tank in the cowl to second tank under his seat. Note easily serviced gas filter at right. Instruments, upper left, are like Model A's.

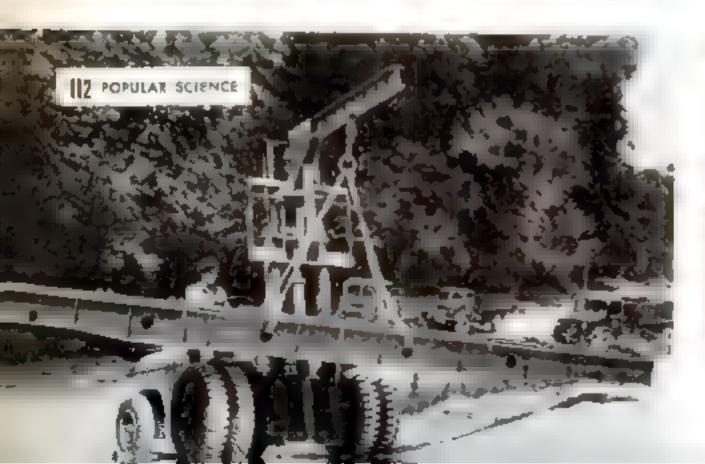




War-Weary Planes Wind Up as Sitting-Duck Targets

THE B-17 Flying Fortress above is giving its list performance is at their through
at antiance at horizon situated by its
changing for and explosive charges fired
under controlled conditions. The purpose of
this unique shoring gallery at the Aberdeen Proving Gao and in Mary and is to
study the effect of battle damage on fight

Ing place upler controlled coardinate Planes from It to be urbers to light extends we were veterals in the row to the scrip help or booked colors and rised to the desired beight by in receipt which the desired beight by in receipt which the sistence be suspensed by the total passes to strategic various fight conditions.



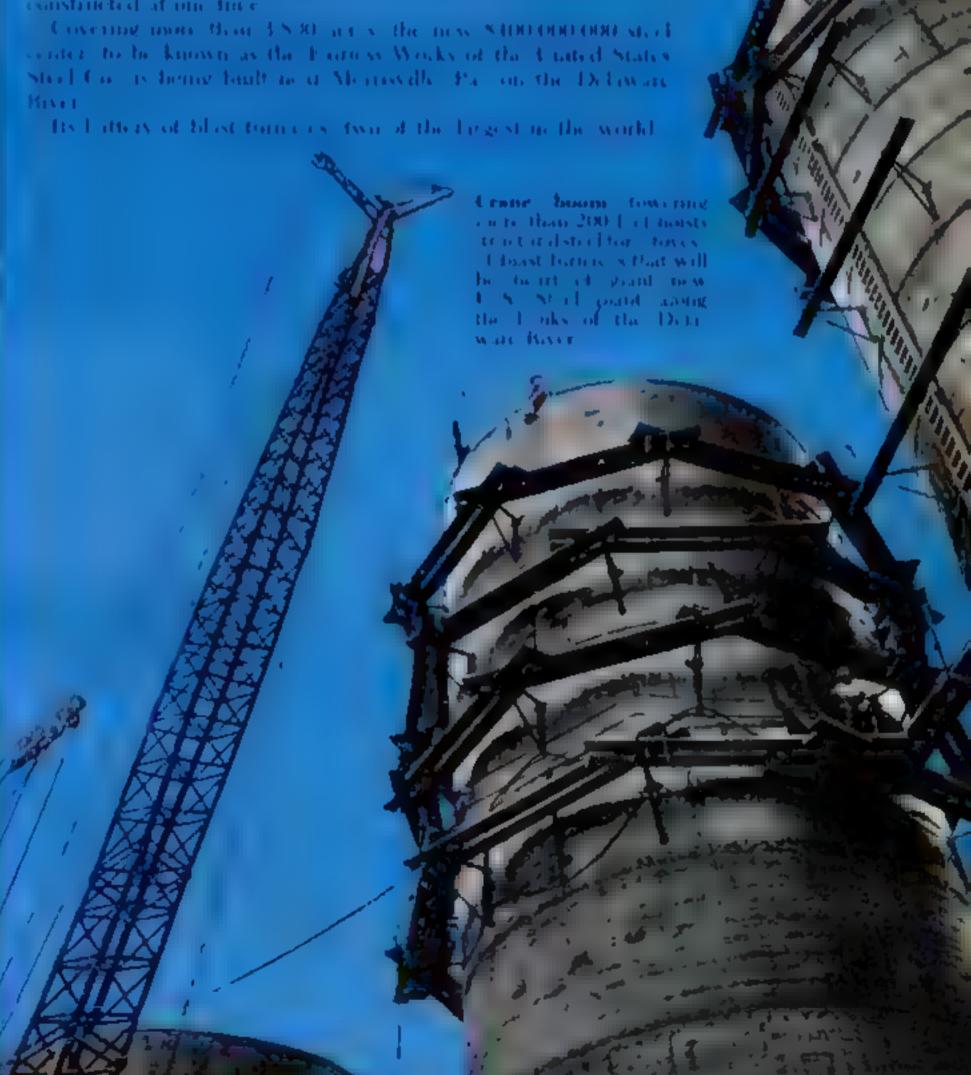
Fork Lift Speeds Bridge Building

lio B tish any las
horoved the factory lock
lat to build bring to
signed to the creating
the famous Bank brings
that alped to short Al
hod thous cross a continue
this me to easis
limites a 2 Shorpand
brings section Al ximin
lengts two tops

New Streamlined Steel Plant to Be World's Most Modern

By George H. Waltz, Jr.

AS YOU read this 8 000 construction workers are rushing to complete a steel plant that wal holster our steel stockpiles for pulitary and civilian needs by almost 2 000 000 fous of ingots as at When builded in 1952 at wall be the world's most modern steel works and the largest integrated steel producing unit ever constructed at one time.





Artist's drawing shows how 3.800-acre Fairless Works of U.S. Steel, near Morrisville,

will be capable of prodomer 3 000 tons of pig iron a div. They will feed the plant's ite tig them had a hotomass with crough non-tatoris out 1 500 000 ters of stocking its a year. That's enough steel to build an ually a tetal of

- 10 arcialt carners,
- 2 heavy or isors,
- 500 amplines,

- 500 ceny troks
- 500 too pace of stills,
- In only a life as
- 3th ded partially
- 5 4 000 h usel. I refrigeraturs!

Once the plant's vangs to full operation the steel will fiew in production line tasks us from the ore storage varie at one end to the trend to value at a cother. The raw mate



Pa, will look when construction is completed next year. It will be world's most modern.

ri ds enough iron ore hinestone and coal every year to fill a train of radroad kopper cars 1,250 miles long—will arrive via the Delaware River

The ore and limestone will be stockpiled in a giant ore yard. The coal will ride a milelong conveyor to two batteries of coking ovens. Each battery will consist of 87 ovens and the two batteries will produce 1,000,000

tons of coke a year. These overs also will produce important tonnages of such coal chemicals as phenol, light oils, ammonium sulfate, crude naphthalene and tar, as well as coke oven gas for use as fuel elsewhere in the mill

The two blast furnaces will convert the iron ore coke and limestone into a continuous flow of pig iron to feed the big mouths

of nine open-hearth furnaces which will turn the iron into various types of steel. Enough bricks to build 1,100 six-room homes are being used for this battery of furnaces, which will be the world's largest.

From the furnaces, the steel ingots, weighing five to 25 tons, will be moved by rail to the plant's longest building—it will stretch along for more than a mile. There, the ingots will be stripped from their molds, reheated in soaking pits, and then sent through rolling mills to be transformed into various types of steel stock. Each main electric driving motor on these mills will produce as much power as a locomotive hauling a streamlined train.

Steel Mills Are Thirsty

In full operation, the Fairless Works will require as much electric power as a city of 450,000, such as Newark, N. J., Kansas City, Mo., or Seattle, Wash. For fuel, in addition to coke-oven gas, it will use about 9,000,-000,000 cubic feet of natural gas—enough to heat half the homes in Philadelphia—and approximately 42,000,000 gallons of fuel oil every year.

All steel plants are heavy water users it takes about 150 tons of water to produce a ton of finished steel—and the Fairless Works will be no exception. About 230,-000,000 gallons a day will circulate through the plant for cooling and cleaning. Some will be pumped in from the Delaware River and some will come from wells. More will be put back into the river than is removed, and it will be cleaner than the water drawn from the river.

Soot Will Be Trapped

The bellowing clouds of black smoke and gritty soot that most people associate with a steel mill won't be visible at the Fairless Works. The blast furnaces will have dust catchers and electric precipitators to remove any fine ore particles that might otherwise escape. The trapped furnace gases then will be cleaned and used to heat the tall cylindrical furnace stoves that heat the air for the blast.

The coke ovens will be of a type that traps the smoke and gases generated during the coking process, and special equipment installed in the open-hearth shops will prevent dust from entering the furnace stacks. In addition, all locomotives used on the plant's 70-mile standard-gauge rail-road will be Diesel-powered.

The Fairless Works is the largest single element in a defense program that eventually will add more than 4,000,000 tons a year to the capacity of U. S. Steel's facilities. It will be a major factor in the effort to boost the 1950 production figure of 97,000,000 tons of steel ingots to 118,000,000 tons by the end of 1952. That will be just about three and one-half times what Russia and her satellites were able to produce last year.



This steel-storage warehouse skeleton looks big, but is short compared to a mile-long ex-

tension that will house rolling mills and soaking pits to heat ingots.



When high-speed, jet-propelled seaplanes are built, they probably will look like this model.

Supersonic Seaplanes Are on the Way

IN A preview of seaplanes that may fly faster than the speed of sound, sleek little models, powered by four miniature jet engines, are taking off from the choppy waters off San Diego bay. Controlled by radio from the ground, they streak along at a scale

speed of 632 m.p.h.

The first full-scale version of the Skate, so called because its shape resembles a fish of that name, probably will be a twin-jet, water-based Navy night fighter. Flight tests with models indicate that it will be able to take off in 15 seconds; fly about as fast as present jet interceptors; plane through seas with 12-foot waves; land in seas that would swamp today's seaplanes.

Flying boats have always suffered the speed disadvantage of a cumbersome hull that had to be deep, not only to buoy up the plane in the water, but to provide clearance for the propellers. Switching from props to jet propulsion, a young engineer with the Consolidated Vultee Aircraft Corp., Ernest G. Stout, set out to design a seaplane so aerodynamically clean that its speed in flight would be limited only by the power of its engines.

To achieve his goal, Stout devised the blended hull-wing—in effect, a flying hull. When the engines roar, all areas of his Skate, from tip to tip, from stem to stern, exert lift. The sweeping lines of his hull, however, didn't lend themselves to an easy break-away from the water. So he put a 45-degree



Ernest Stout shows off blended hull-wing of 1/13-scale model of his Skate Seven. Full-size version will have 75-foot wingspan, be 62% feet long, stand only nine feet high.

retractable step under the hull to lessen the drag of water on take-off.

Another flying-boat problem he had to lick was spray. This he did by installing narrow metal strips sloping downward from the hull. Acting as dams, they deflect the spray down, robbing it of its bounce and force. The spray dams are also retractable.

Skate Seven, shown at the top of the page, isn't the final development. Versions eight and nine are flying secretly—and one may be a supersonic model. If not, Stout has plans for a delta-wing seaplane.



Father and Son Build Hot Rod

YOUNG Monte Trone, Long Beach, Calif, high-school student, wanted a fast coupe of his own—but bad. He decided to build it himself after school hours and with his dad's help. Three years later the job was done—a sporty hybrid that's clipped a neat 123 m.p.h. in supervised time trials on dry-lake speed courses.

A 1933 Ford chassis was the starting point. Monte installed a racing-car nose and

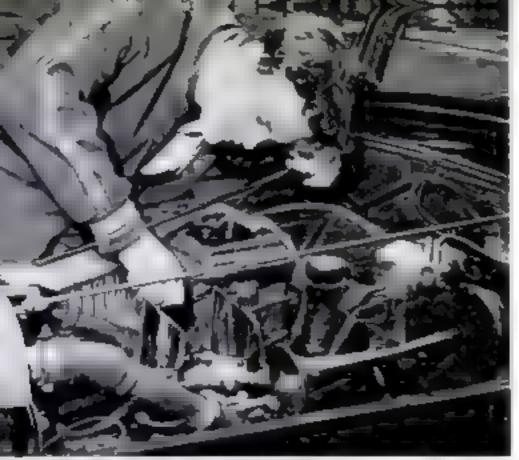
hand-formed the rear fenders to their new contour, adding a %" welding bead for reinforcement. Then he redesigned the hood panels and altered the cowl to fit. A lowered front axle makes the car slope down.

Supplying power is a souped-up 59A Mercury block. And as befits a proud craftsman, Monte put his signature on the job by welding monogram initials on the front nerfing bar.



Tail plate of reworked Ford coupe shows Monte is a member of the Cavahers, a Southern California group of car-building enthusiasts who also are leaders in a safe-driving campaign.

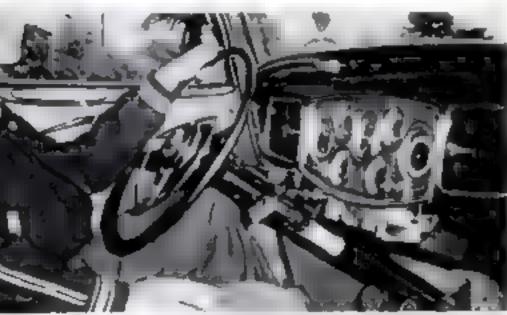
Chromed front axle was lowered three inches, producing a sleek, nose-down look. The top of the coupe barely reaches the young builder's shoulders. Car is finished in jet black.



Mercury block was rehoted 060 meb. stroked and, perted, releved and electromeally balanced. The battery box and landers were bonies usage. Li gine has 265 cu san displacement.



Rear fenders were partly out away for appear that Rear wheels were made by wilding Ford center sections to Buck outer runs. Combination channates side roll, says. Monte



Dash panel and instruments came from a 1932 Packard Custom, one of only a dozen that were built. New gauge added in center is an r.p.m. counter for acceleration tests and time trials.



Mine Detector Spots Nails

THE worker above doesn't expect to find an explosive mine in the log he is checking. But the war-surplus detector will warn him of hidden nails and bits of metal that could wreck equipment in the sawmill of the Monon Lumber Co., New Albany, Ind. The metal can then be removed before it does any damage.



Jets Show Afterburners

STREAMS of fire against a dark sky spurt from the tails of Lockheed F-94s as they turn on their afterburners for an extra burst of speed and climbing power. Shown starting on a night training mission over the Pacific, the Air Force all-weather jets are the first planes to place afterburners in operational use.

Giant Doughnut Proposed as Space Station

A rocket scientist presents a design for a man-made, man-carrying satellite to circle the earth 1,075 miles up.

INWARD is "up" and outward is "down" in the extraordinary structure pictured here. Dwellers in it would walk on its outermost wall, their heads toward its hub.

The drawing gives a scientific preview of an inhabitable "space platform" floating in the sky at a 1,075-mile altitude and

circling the earth as a satellite.

An "artificial moon" such as this could serve as a military base, observatory and rocket-ship refueling station. Its possibilities have been reported under study by the Department of Defense. What it may look like is now revealed by a former German V-2 rocket expert, Dr. Wernher von Braun, of the Ordnance Research and Development Sub-Office, Fort Bliss, Texas. In a book just published by the University of Illinois, Space Medicine, he presents his conception of a feasible design.

Will Make Own "Gravity"

His proposed space platform, of 200-foot diameter, resembles a giant doughnut. It rotates slowly on its axis. As if in a submarine, its crew live and work inside its airconditioned and pressurized rim.

Gravity will be absent. But centrifugal force from the rim's rotation gives occupants a foothold and enables them to walk along the wall. This artificial gravity also averts possible ill effects of prolonged weightlessness upon the human system.

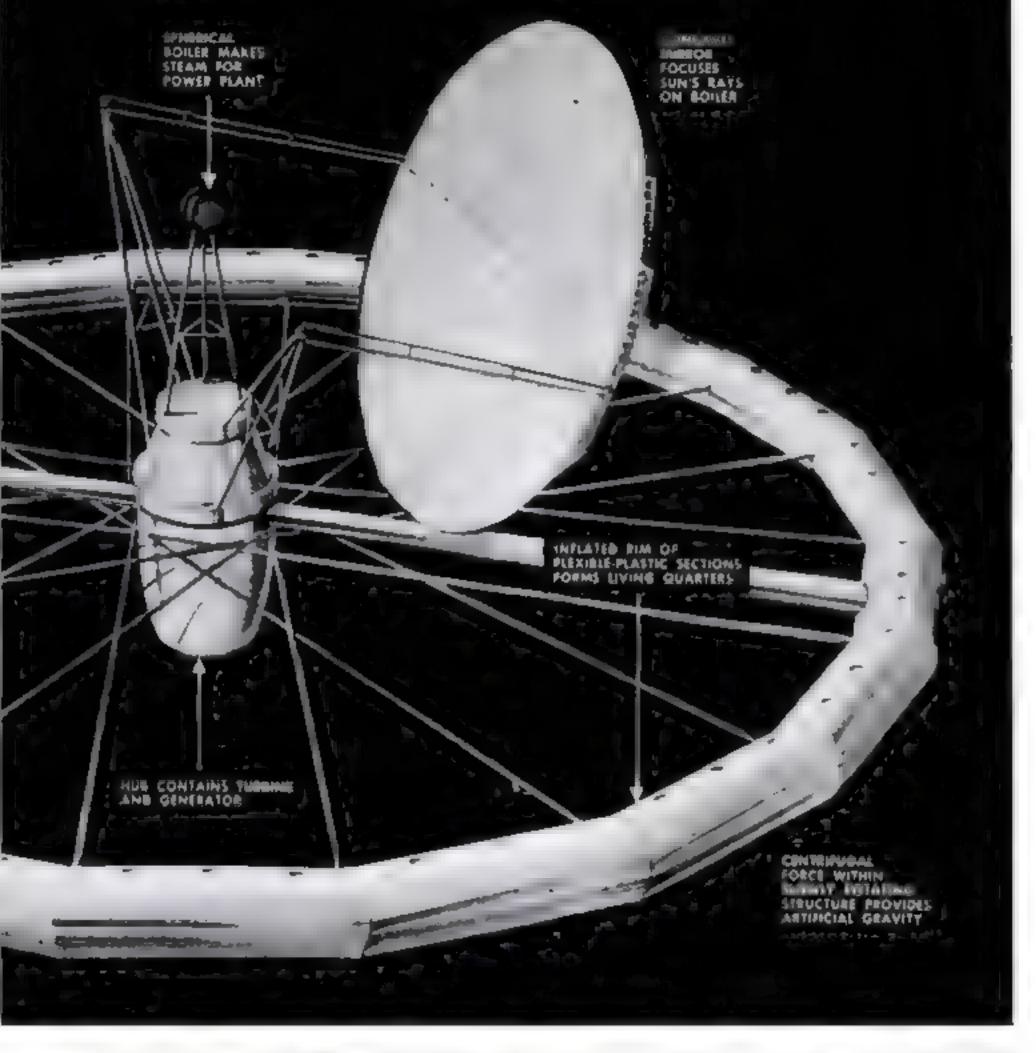
A silvery concave mirror focuses solar rays upon a boiler, making steam to run a turbine and generator for electric power.



By rocket ship, Dr. von Braun proposes, the platform's parts will be carried to its orbit for assembly there. Ten to 20 collapsible sections of flexible plastic, which can be unloaded through small hatches, will form the bulky rim. Men in pressurized space suits will join them and inflate the ring like a tire. Unloaded at an orbital speed offsetting the earth's pull, men and materials will float in space, as will the assembled platform.

But its inhabitants will not be marooned there. Rocket-ship "ferries" plying between the earth and its new satellite will pick up returning personnel and deliver relief crews, provisions and rocket fuel.

Feasibility of the whole idea, of course,



hangs upon developing rocket ships that can erect and serve the space station. Such a ship, Dr. von Braun has calculated, will be a triple-stage rocket of 30-ton payload, about 200 feet long and 65 feet in maximum diameter. In flight it will launch a second, smaller rocket and this one will in turn launch the third and final rocket carrying passengers and cargo. The third-stage rocket will be winged for a gliding landing on its return to earth.

Satellite Could Drop Bombs

Incentives to erect a space platform are urgent, Dr. von Braun points out. An observatory free of atmospheric disturbances, it could have telescopes powerful enough to see people on earth. It would offer weather forecasters and astronomers an ideal view of the earth's cloud formations and the stars. As a way station, it would speed the day of interplanetary travel.

More immediately vital, it would make a non-interceptible bomb carrier, swooping around the earth in two hours at a height beyond reach of present defense weapons. It could haunch rocket missiles and guide them accurately by remote control and radar to any spot on earth.

"It appears to me," Dr. von Braun declares, "that in the atomic age the nation which first owns such a bomb-dropping space station might be in a position virtually to control the earth."



New British Rifle Outfires U.S. Garand

THE place: Westminster, England. The contestants: A new British .280-cal. automatic rifle vs. the U.S. automatic Garand M 1. The score: 84 rounds of fire a minute to 44-in favor of the British .280.

A radical departure in design, the new British weapon, developed by the Army after five years of research, has no wooden stock, is almost a foot shorter and more than a pound lighter than the Garand, and carries 20 rounds of ammunition instead of eight. It has an optical sight in place of the Garand's traditional peep type. While the gam's penetration is slightly less than the heavier Garand, it has only half the kick.

Although the British call it "the best weapon of its kind in existence" and plan to adopt it as the standard infantry arm, the U.S. is not likely to switch rifles.

Luxury Car for Argentina's President is Air-Conditioned



A REFRIGERATOR unit (arrow), powered off the fan belt, will lower the temperature 15 degrees inside a de luxe, \$11,000-Cadillac fancied up for Argentina's President

Peron and his wife, Eva The unit also will fee a built-in bar. Among other gimmicks are back-seat television, telephones, folding tables and bulletproof glass.



Radium Substitutes Equal World's Supply

Atomic-base vicit - technicians shove are uncorking one of two tiny bundles of radioactive energy that will each emit as much gainma radia tion as all the radium that existed before World War H. Made of the rare isotopes cobalt 60 and tantalum 152, the new highly powerful radia tion sources will make many industrial experiments possible for the first time. Prepared at Brookhaven they will irradiate test samples submitted by industry, then the samples will be returned for study. They are expected to find early use in research on food preservation and plastics.



Radioactive tantalum under several feet of water in the reactor "canal" emits enough light to take its own puture. Pipe and rope are used to handle isotope.



Rim Saw Rips Big Timber

This circular saw blade has no middle-just a toothed rim. A 30-inch band of steel rotating in a light aluminum frame, it will cut through trees up to 30 inches thick without any central shaft to get in the way or add weight. Driven at the edge by a flexible shaft from a small gasoline engine, it can be held at any angle, even laid flat on the ground for cutting down trees without leaving stumps. The blade rides on three hall-hearing rollers in the frame, and a hook holds it firmly against a log while cutting. The Barker Saw Co., of Springfield, Mo., makes the outfit.



Pillow balloons are being tested for leaks, "Svoboda" is "freedom" in Czech and Russian.

'Freedom' Leaps Iron Curtain

Another type of freedom balloon starts its castward journey from Minnah, Made of robber, the 24-meh sphere will rise to 25,000 feet, when it will burst and rain its messages



AN AMERICAN assembly line is turning out "freedom balloons" that are then stuffed with pro-democratic messages and released in West Germany to float with the prevailing winds over the satellite countries behind the Iron Curtain

The pillow balloons shown above accused of being the original flying sancers were developed by General Mills at Minne apolis for upper-air research. Made of .0015-inch polyethylene, they are 54 inches square, and differ from ordinary balloons in that they do not stretch. Thus, with rate of use aping gas known, specific targets can be bit with a high degree of accuracy, making them ideal for the Crusade for Freedom.

Besides being able to carry a quarter of a pound of printed messages inside, their 2.916-square-inch surface makes a good "billboard" for freedom slogans. They also create good will among housewives, who eagerly grab the balloons and use the plastic for wrapping food or as tablecloths.

24 POPULAR SCIENCE

Wilbur Shaw Reports on

GM's New Engine

It looks like good news for motorists this experimental 12-to-1 power plant. . . . Plenty of hustle plus more mileage.

By Wilbur Shaw

AT THE General Motors Proving Ground in Milford, Mich., I bent over a black box on the front seat of an automobile. It had two dials on it. Twin needles on one of the dials gave a composite reading of 2,328 Similar twin needles on the other dial gave a reading of 1.58.

The first figure stood for revolutions on a counting wheel attached to the back bumper of the car, the other one for time cabbrated in minutes and hundredths.

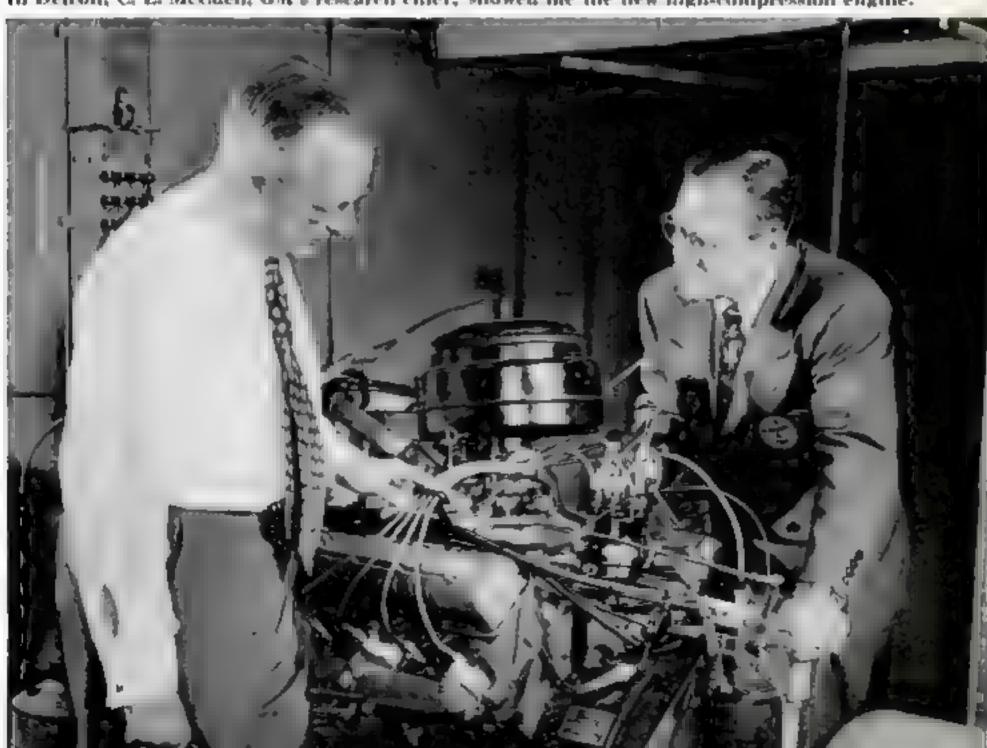
"There's your answer," commented an engineer beside me.

Without interpretation, the readings on the two dials were only a couple of figures in a mountainous mass of research statistics compiled daily at the proving ground. To the engineers tracking down the inside dope on a new high-compression engine, they were highly significant.

They meant that this experimental engine, with a shortened stroke, a special head and super-octane fuel, could drive a car as hig as a Cadillac almost 30 miles at city traific speeds—on one gallon of gasoline.

If engines with 12-to-1 compressions, like this one, eventually come into general use motorists will get at least a third more gas

In Detroit, C. L. McGuen, GM's research chief, showed me the new high-compression engine.





The fifth wheel is a standard device for measuring distances traveled on a test track. Fuel burned in the 12-1 car costs GM 35 cents a gallon in bulk, would cost you and me a lot more.

This little box contains exactly 74 cubic centimeters of fuel for a test run. Electrodes cut off the main gas supply to the engine and reopen it when the run has been made.

mileage out of their cars even at 70 miles an hour on the open highway.

They will get the same scat they obtain from today's engines out of smaller engines tomorrow. And smaller engines would mean lighter-weight cars.

That was the reason I went to the proving ground—to get a first-hand feel of a development that promises so much for the future. I came away with some news not only about engine research but also about a new experimental Hydra-Matic transmission.

Before going to the proving ground I visited the Research Laboratories Division of General Motors in Detroit. Here they had another of the high-compression engines on test. I sat in a remoted control room and manipulated the throttle and spark on this engine. All about me were instruments that told how the engine's power output varied with throttle setting and how it reacted to

I manipulated the controls on the high-compression engine being block-tested in the laboratory. The scale you see in the right background registers amount of torque developed.



fuels of different octane (anti-knock) ratings.

Testing is the part of the research process that takes the time. Designers immerse themselves in higher mathematics to project the specifications on a new engine. They build it. They plot its probable performance. Then they spend thousands of hours testing it under controlled conditions to see how close they came.

Putting an Engine on the Spot

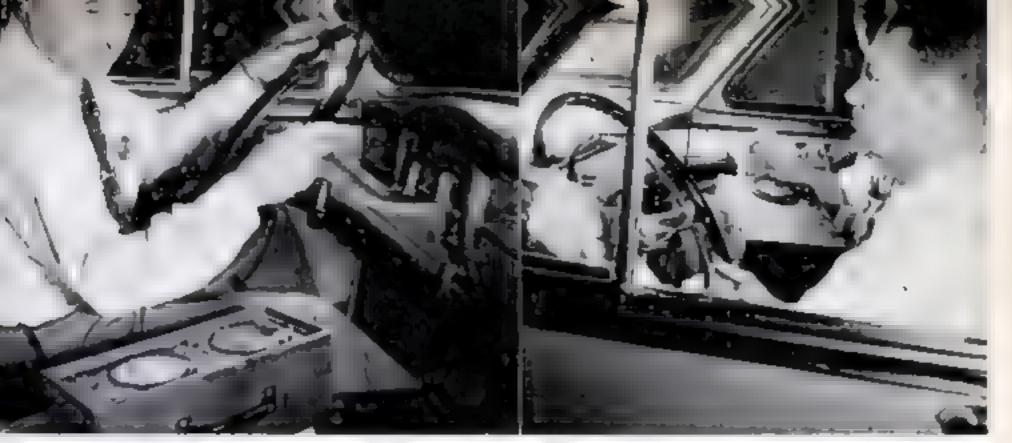
The proving ground is something else again. Here engines on test are put into automobiles and road-tested under any and all conditions of temperature and humidity. This simulates the kind of treatment that the engines would get if put in the hands of hundreds of thousands of motorists.

The particular engine I came to see was dubbed the "19XX." The "19" stood for the century, the "XX" for a question mark as to the year it would—if ever—reach the sales-rooms on America's Automobile Rows.

There were instruments at the proving ground too, but they were portable. They were mounted on or carried in the car equipped with the test engine. The black box that I've mentioned depended on two separate instruments to deliver its readings.

One was the fifth wheel. This is a wire-spoked breycle-type wheel with a generator attached to it. As the wheel revolves through its free contact with the roadway, it generates electricity. The current is fed by a wire temporarily routed through a rear window of the car to the box on the front seat.

25 POPULAR SCIENCE



A wheel-revolution counter and a clock, shown here, are indispensable in figuring a car's actual speed. The availability of high-octane fuels is something yet to be determined.

The other instrument you see here, in the hands of the GM engineer who rode with me, tells how far the spark can be advanced on fuels of various octane ratings without getting a knock.

There a galvanometer, an instrument for measuring voltage, calibrates the strength of the current in terms of wheel revolutions.

The fifth wheel supplies one of the pieces of information needed to determine fuel consumption—exactly how far the car travels.

A second item of information needed is how long it takes the car to travel a certain distance. That's supplied by a clock. If the engineers know the distance traveled and the time it took, they know the miles-per-hour. The miles-per-hour figure is important because gasoline consumption changes with speed.

Still missing, of course, is a third piece of intelligence—how much fuel was used to drive the car a given distance at a given speed. That's supplied by a box clamped to the front bumper of the car. In the box is a chemist's burette, a vial, containing exactly 74 cubic centimeters of fuel. A fuel line to the engine is attached to the top of the burette.

Running Out of Gas on Purpose

When a test run is made, water treated with copper sulfate is cut into the car's fuel supply line below the burette. The copper sulfate boosts the water's electrical conductivity. When the water reaches an electrode on the bottom of the burette, it sends an impulse to the black box. This starts the recording mileage meter and the clock. As the fuel flows from the top of the burette and into the engine, the water takes its place. When the water reaches an electrode in the top of the burette, it stops both the instru-

ments. The fuel in the burette has been used up and the engineers start their calculations.

And here are the formulas used by the engineers to get their fuel consumption and the speed of the car:

The miles-per-gallon equals the figure .0116 multiplied by the figure on the revolution counter-2,328.

The miles-per-hour equals the figure .0272 multiplied by the figure on the revolution counter divided by the time consumed.

High Compression Lowers Costs

When, as I bent over the black box, the engineer beside me remarked, "There's your answer," he meant the new engine had done better than 27 miles to the gallon going 40 miles an hour.

Up to now, the best performance recorded by the engine is on 100-octane fuel treated with .4 cubic centimeter of tetraethyl lead—the same "booster" compound you get in your own gas. The fuel thus treated goes off the standard octane chart, which stops at 100 octane. GM has no doubt that presently it will be operating the engine satisfactorily on fuel of less than 100 octane.

I drove one of the 12-to-1 engines in a research car on the "Loop" at Milford. The Loop is a research version of a race track. The car, in all but engine and a change in the rear-axle ratio, was a Cadillac.

The new engine has a bore of 3% inches and a stroke of 3%. That compares with 3 13/16 and 3% inches respectively for the Cadillac's. The block is an Olds, specially bored. Piston displacement is 287 cubic



I drove the new engine at 70 m.p.h. on a wet track. It gets almost 20 m.p.g. at that speed.

inches compared with 331 for the Cadillac's, and the "19XX" develops 15 more horse-power than the maximum brake horsepower of the Caddy. The test car had a rear-axle ratio of 2.75 to 1. The Cadillac's is 3.36 to 1.

In almost every department the car matched the performance of the standard Cadillac. The engine carned me effortlessly into the higher speed ranges. High compression usually causes a little roughness, but I detected no roughness here.

More Mechanical Octanes

Performance matched that of the production engine with a compression ratio of 7.50 to 1. And that's exactly what GM was aiming at. All the added comph of the 12-to-1 compression was being poured into fuel efficiency—more miles to the gallon. And they were getting the same acceleration and just a bit more top speed, plus better gas mileage, with a considerably smaller piston displacement.

The secret of the engine's performance was a union of "mechanical" and "chemical" octanes. Mechanical octanes, extracting more energy from a gallon of fuel, lie in engine design. An engine with a high mechanical octane rating "rejects" less heat. More of its heat goes into power and less is dissipated through radiator and exhaust.

To make use of its mechanical octanes, the engine had to be fed fuel containing more chemical octanes—gas that would burn better.

And now about that new Hydra-Matic transmission, As I rolled off the Loop and started up a hill on the proving ground, it proved itself. I left another Caddlac, equipped with the regular Hydra-Matic, as though it were standing still. When I slipped the selector lever into an extra notch on the quadrant, the car marched up the hill without that annoying shifting back and forth between gears in response to the torque demand.

In a word, the experimental transmission affords a motorist a dual range for performance. This is the way the selector quadrant on the steering post looked:



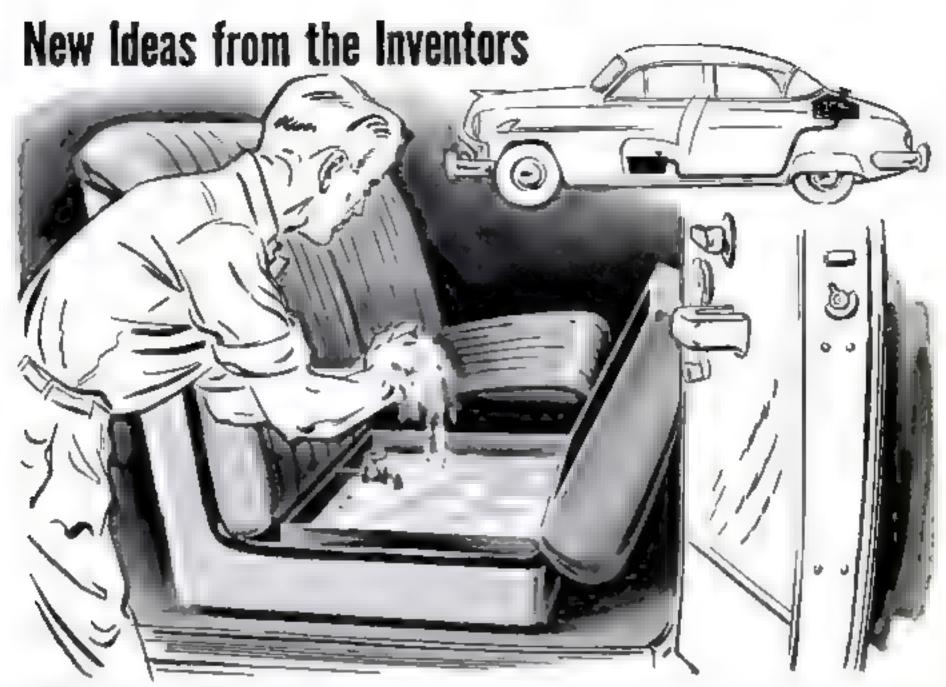
It gives you all the advantages of a quickchange rear end without your having to change the gears. For the conservative driver, it affords economy. For the hot-rodder, it offers top performance.

As I coasted into the garage area of the proving ground and switched off the ignition on the new engine, I glanced again at the black box with its two enigmatic dials. It was a sort of portent of the future.

This Month's Shaw-ism

A safety hint: drive as though everyone else on the road was crazy.

Rilling Sha



1 Car Seat to Hide Washbasin. This idea would make it easy to wash up after changing a flat—it proposes a washbasin built right into the front seat. Pressing a button on the dashboard would trip a solenoid-

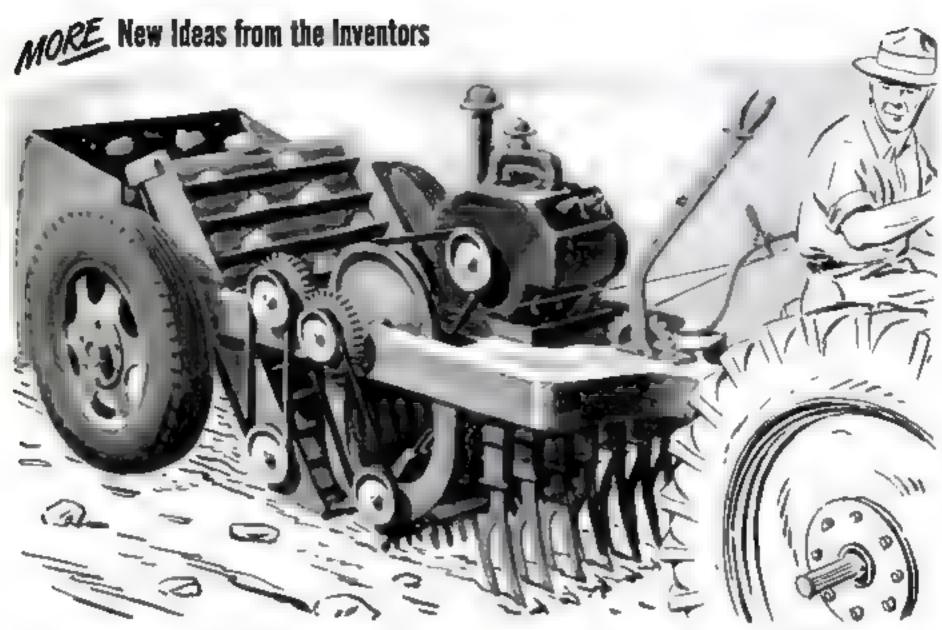
operated catch, letting you raise the cushion next to the driver's seat to uncover the washbasin and spigot. Water would be piped to the basin from a tank located in back of the rear seat, as shown in inset.



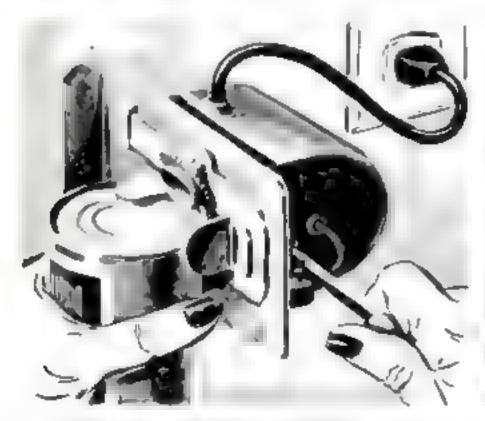
2 Magnifier to Fit Sewing Machine. Getting the thread through the needle would be simpler with this magnifying lens. It would also give the sewing-machine operator a closer view of the working area. Fitted with a clamp, the attachment would mount on the stem of the machine's presser foot and could be adjusted to any angle.



3 Magnetic Iron to Aid Presser. A person wouldn't have to work hard to remove wrinkles from clothes with this magnetic iron. Permanent magnets inside the apphance would hold it firmly down on an iron plate in the ironing board during pressing. To lift the iron, an extra control knoh would raise the magnets to reduce their pull.



4 Machine to Pick Up Stones. Pulled by a tractor, this farm machine would dig stones out of the soil and then pick them up and haul them away. The stones would first be loosened by a row of curved teeth. Then a series of rotating claws would throw them onto a conveyor belt to carry them up to a hopper. A small gasoline engine would furnish the power to drive the claws and the conveyor belt.



5 Motor to Turn Can Opener. An electric motor would do the work of opening cans in this invention. Pushing down a lever forces a rotary cutter into the top of the can and automatically switches on the motor. The motor rotates both the cutter and a feed gear that turns the can. Lifting the lever releases the can and shuts off the motor.



6 Dispenser to Light Cigarettes. This dispenser would not only hand you a cigarette but light it for you too. Push a lever and a cigarette drops into a spring-operated well. When the lever is released, the spring tips the well so the cigarette presses against an electric lighter. Lifting out the cigarette would shut off the lighter.

Potents on these inventions have been granted to: I. P. Bailey, Oakland, Calif . I K Warner, Chicago; 3. C. Leonard, Cincinnate; 4. A. Cintule, Norwood, Mu.; 5. R. Rash, Rochester, h Y , 6. G Thomas, Long Beach, Calif



He Turned a Hobby into a Big Business

When the chips were down, young Leo Pavelle put his camera to work. Today, other people's cameras pay him off in fancy money.

By L. B. White

YOU can't spend two hours talking to Leo Pavelle, the original human photoflash, without wondering how many guys are going around hungry with a fistful of thousand-dollar bills in another suit.

That's right another suit nearly everybody has more than one "soit" of talents, skills, know how—whatever you want to call it. Most people call these spare vocational garments hobbies, and leave 'em hanging in the closet when they go to work.

But Pavelle, the 44-year-old genius of a \$2,000,000-a-year photofinishing business that has revolutionized the industry has been wearing his hobby



Color processing of Printons is automatic in the machine above. Special air-conditioning system that keeps temperature at 72° allows a variance of only one-tenth of a degree.



Automatic enlarger, designed by Leo Pavelle for color work, has been converted to turn out black-and-white enlargements at the rate of 1,000 an hour. It will cut costs considerably.

to the office for 19 years—because the suit he originally ordered, mechanical engineering, came with empty pockets in 1932.

Maybe it would be more accurate to say of this Henry Ford of the hypo tanks that he wore a natty sports jacket over his cosmolene-stained overalls when he stepped out of college with a degree in mechanical engineering. Engineers then were a drug on the market. But he had a hobby and he combined it with his engineering knowledge. One result was a machine that turns out 1,000 enlargements an hour. Another result was a continuous roll printer that grinds out contact prints even faster.

Time for Other Hobbies

And, just in case this jalopy-to-jaguar success story sounds like all work and no play, let it be noted that several times a year Leo Pavelle slips a hunting or fishing coat over his professional ensemble and whips off to Cape Cod for some surf-casting, or to the High Tetons for elk, deer and grizzly. And almost any evening you can find him in his home workshop in suburban Mount Vernon, hacking out stocks and grips for a gun-and-rod collection that some day may be worth...

But that's another hobby, another shrewd

investment-and another story.

Leo Pavelle was born in 1907, in Dvinsk, in what between world wars was reborn Lithuania. His father brought him to New York in 1920—and he proceeded happily through high school and two years of college before the bottom dropped out of everything. The young engineering junior then had to think about how to earn the money to finish school.

On the Road to Photo Fame

Fortunately for him, he had one of the first German Leicas to reach this country. With it, he could do eye-catching work. At first, he made home portraits. Then he won a reputation on Broadway by photographing stage shows during rehearsals. The only hitch was that commercial photofinishers literally did not know what to do with miniatures: they groaned and threw up their hands whenever the midget film came into the shop.

But Leo turned this disappointment into an asset. He studied literature put out by the Leica people and the German photography magazines. If he could get a foot in the door of a finishing plant with adequate facilities, he felt certain he could utilize a developing process by which silver nitrate is used to deposit a metallic silver layer on the latent image, thus achieving a much finer grain than was then obtainable.

At that particular juncture, he had the good fortune to meet his future wife, Carrie. Carrie's two brothers can a photofinishing plant, Leo worked there summers during the years he was attending college, earning enough money to complete his education—and at the same time successfully trying out his theories of how to get good enlargements from Leica film.

Better Work Gets Business

Another thing he discovered that summer—one that was to stand him in good stead ever after—was the secret of how to get, and keep, business. He had had the discouraging experience of commercial finishers shrugging off poor prints as the photographer's fault. "You must have underexposed" and "You must have overexposed" were the clichés at camera shop and drugstore pickup counters. The theory seemed to be that amuteur snapshooters ought to count themselves lucky if they could identify their subjects at all.

Pavelle, the ex-amateur, felt that anyone who cared enough to invest time, effort and film in his pictures deserved better of the darkroom boys. He experimented with ways to correct under- and overexposure. He scribbled friendly tips on slips of paper and stuck them in with his customers' prints. Soon, through the independent outlets he was building up, he was acquiring a reputation as "the fellow to send your film to." Camera clubs perked up their ears.

Lea Takes a Wife and Partner

In 1932, Leo and Carrie got married and went on their own. Business grew, slowly but steadily. It was hard work, because the Pavelles insisted on craftsmanlike results. Then, in 1933, Zeiss introduced the Contax to America. To Leo Pavelle, who at that time probably had more of a reputation in Germany than in this country, went a fat commission to do a raft of display pictures to advertise the advantages of the new midget for candid work. He spent a week at the famed Bronx Zoo, snapping animals in hundreds of natural split-second poses, and emerged with a hundred 16 by 20 prints that are still considered classics. Magazines then began to page Pavelle for tricky assignments.

[Continued on page 244]



A hunting trophy is added to the growing collection in the Pavelle home in suburban Mount Vernon, N. Y. Here son Arthur helps his Nimrod father hang a prize head for just right effect.



Away from photo lab, hunting and fishing are the boss's favorite relaxations. In addition to an enviable rod-and-gun collection, he owns every type of camera on the market today.

5 DON'IS for Drivers

If you want to drive and stay alive, these photos of the most dangerous highway mistakes show you what not to do.



Passing on the wrong orde while the driver of the car on the left stubbornly hugs the center line and refuses to move over is one of the commonest—and deadliest—driving errors.

takes four times as much braking energy to stop a car at 40 m.p.h. as it does at 20.

Driving astruddle of the center line is another death-inviting habit. The man hogging the road

here may want room in case of a blowout, but

he's taking chances, not precautious,

IT LOOKS as though someone is heading for the hospital—or worse. The five pictures on these two pages eloquently illustrate common driving mistakes that account for a substantial portion of the terrible toll of lives on American streets and highways—35,000 people killed each year.

The "accidents" look real, but they aren't. The cars were photographed standing still by the Standard Oil Co. of New Jersey as part of a safety campaign. Then the car "in motion" was backed up slowly while the shutter of the camera was left open.

A sixth common error is forgetting that it

34 POPULAR SCIENCE



Speeding is the Non-her One highway killer. It took 13,300 lives last year. Observing the

legal heart isn't enough 30 mph can be too last for some road or traffic concations.



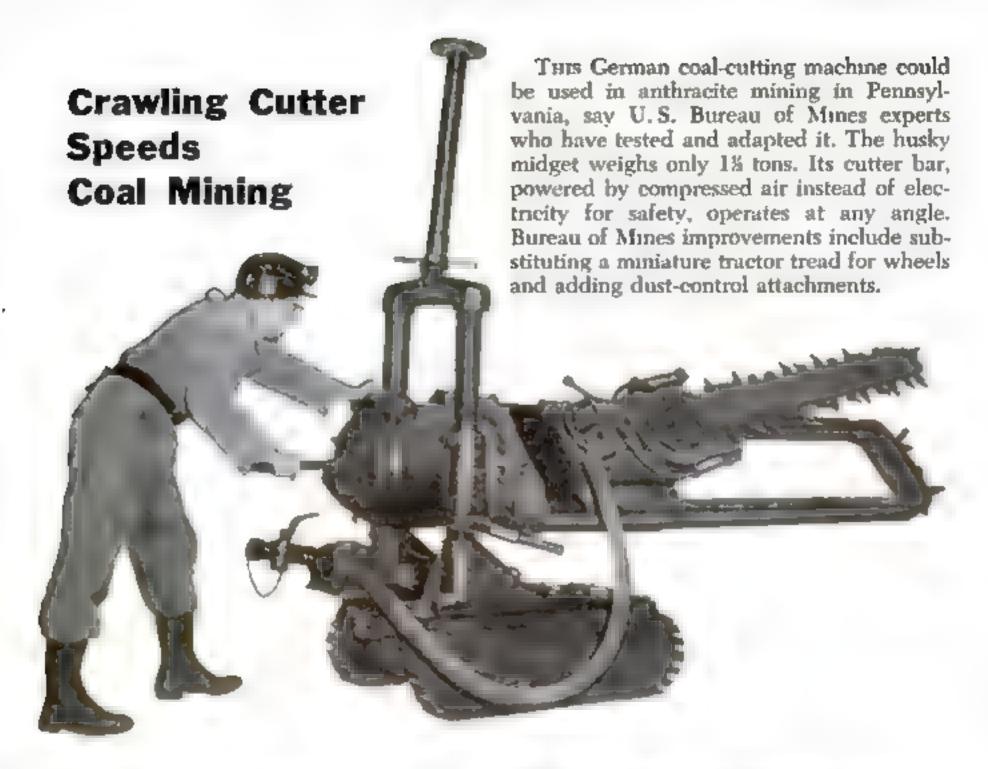
Driving off the road kills 7,000 persons a year. Blinding lights or swinging too wide when

passing may jeopardize the other fellow. And don't larget the central igal force on curves

That hand signal in the car broadside to you cuised tais one. The driver waved for a right

turn and then sweing left. Improper signaling causes tens of thousands of smarriags.



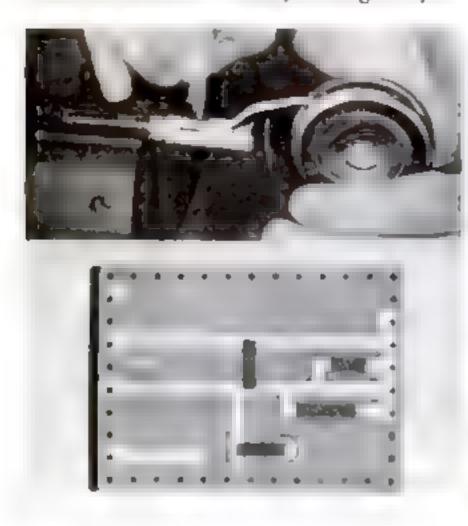


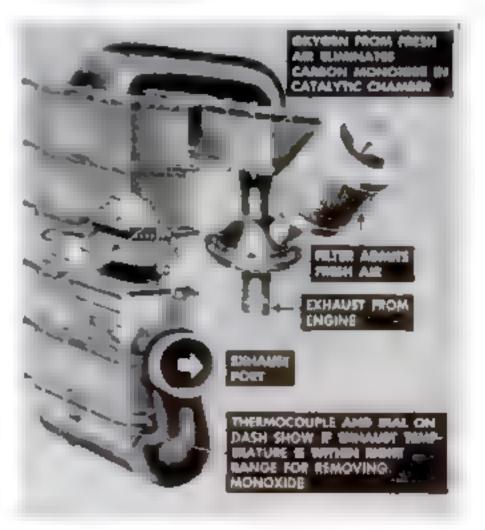
Tape Forms Resistors

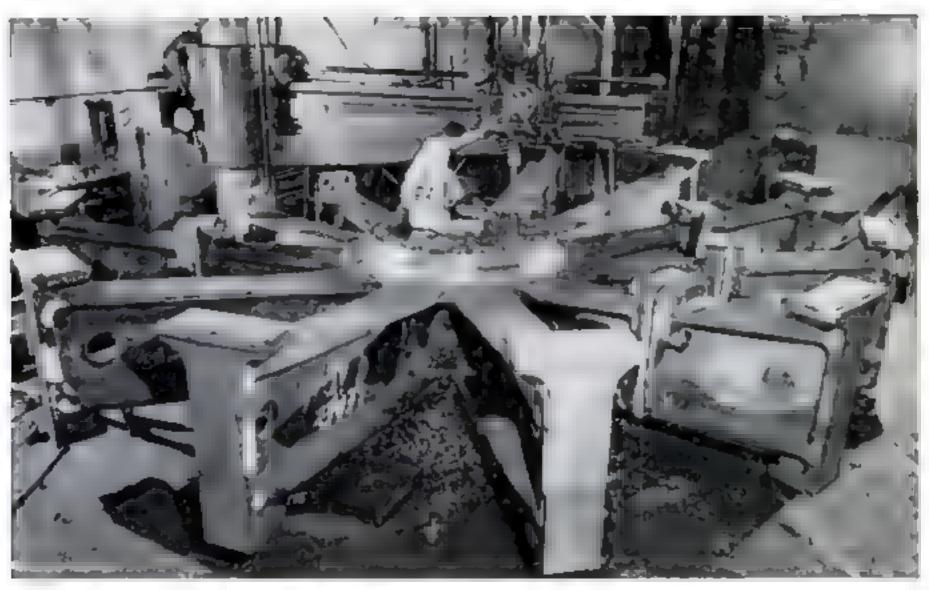
ADHESIVE tape cut from a roll (top view) now forms the resistances in "printed" electric circuits (lower view). It is made of asbestos paper coated with carbon black or graphite. Usual length is one-half inch; for different resistance values, coatings vary.

Muffler Makes Exhaust Safe

BY MIXING fresh air with exhaust gas in a catalytic chamber, the Houdry muffler below eliminates the lethal carbon monoxide. Following successful operation indoors on factory lift trucks, it will soon be adapted for use on motor cars.



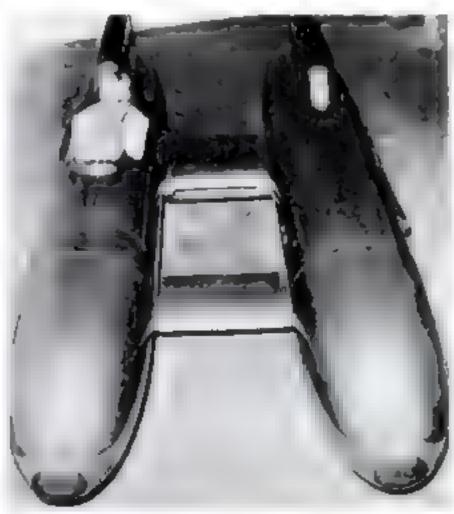




Big Spokes for Big Wheel

MEASURING 25 feet in diameter, the 55-ton "spider" above will form the spokes of a 215-ton rotor in a giant hydroelectric generator at Buggs Island, Va. A waterwheel

and 34-ton shaft will spin the Westinghouse rotor to supply power for the nation's defense program. Ends of six of the spider's arms are removable, so that it can pass under bridges en route to its destination.



"Torpedo" Car Hits 191 M.P.H.

EUROPE's hottest hot rod has set two speed records in Italy—186.25 m.p.h. for a mile, 191.34 m.p.h. for a kilometer. Its builder and driver, Piero Taruffi, occupies one of the car's twin torpedo-shaped hulls. The other houses the 280-hp. motor.



Hangar Shuts Up Like Clam

"CLAMSHELL" is what Marines call the world's first mobile hangar—because it works like one. While it's open, Marine planes at Cherry Point, N. C., taxi into place. Then, on wheels and tracks, the self-propelled halves roll together.

Aids to Modern Living

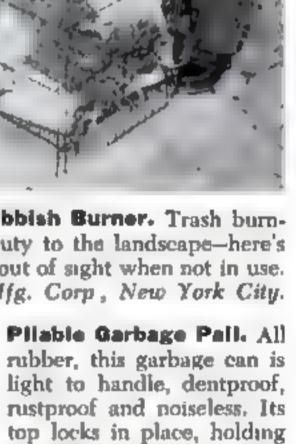


Ladder Balance Bar. Clamp this bar to your ladder and you've something solid to hang onto when washing or painting ceilings. MacLeod Safety Device, Libertyville, Ill.

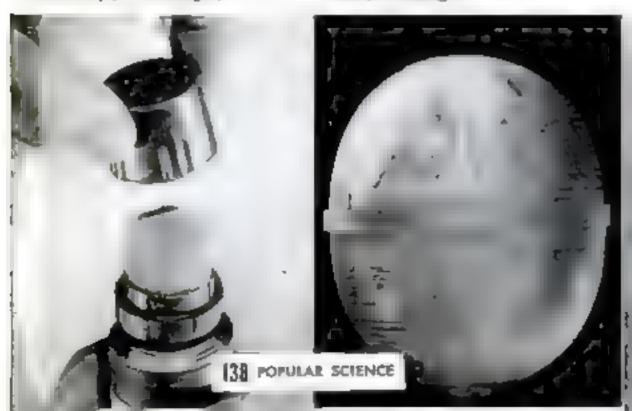
Shaving Ald. Screwed on a shaving-cream tube, this sponge-rubber-and-plastic cap becomes the shaving brush. Moisten sponge, press tube and squeeze lather out. Lathercap, Brooklyn, N. Y.

This plastic Tank Ball. float for toilet tanks is said to be permanently watertight. It won't corrode and is unaffected by hard or brackish water. Amerline, Inc., Chicago.

Fold-Away Rubbish Burner. Trash burners add no beauty to the landscape-here's one that hangs out of sight when not in use. Crown Wire Mfg. Corp., New York City.



in odors. Nesco, Inc., Chi-







Pushbutton Plug. Press down on the button in this plug and a plunger releases it from socket without strain on wires or contacts. Safety Push Plug Co., Toledo.



One-Plece Handle. Sterling-silver knife handles won't loosen up when made by new process using seamless tubes instead of soldered pieces. Gorham Co., Providence, R. I.



Utility Board. This cutting board with suction-cup feet and extending edge provides place to clamp food chopper. General Slicing Machine Co., Walden, N. Y.



Darning Kit. It takes only eight seconds' time and a hot iron to close a hole in your sock with these knitted-fabric patches. Plasti-Stitch, Inc., New York City.

Vacuum-Seal Jars. Just press in place the aluminum disks and rubber rings that seal these refrigerator jars, and foods keep fresh for weeks. The Silex Co., Hartford, Conn.

Pipe Hoister. Hung from your belt, this holder provides a parking place for your pipe while you're working around the house, golfing or fishing. The Village Store, Lake Placid, N. Y.

Long-Range Mop. Pull this duster with the wooly yarn head over a broom to reach cobwebs on the ceiling, or dust furniture legs without stooping. Magic Mop Co., Chicago.







Outdoor Model Railroad Runs

Fantastically intricate models burn coal, operate on live steam and chug around California hills like big ones.

TO GET a ride on this railroad, you don't buy a ticket—you build a locomotive. One that runs. That's the club's way of keeping out the dabblers and the slackers—you have to work before you can play.

These rare model railroaders have another odd notion—they think steam engines should run on steam. Live, hot, high-pressure stuff, ready to blow its boiler's top if you'd let it. Hence the club's name, the Golden Gate Live Steamers.

Most any Sunday afternoon you can find its members in the rolling hills of Oakland, Calif., riding around a sprawling elevated track behind a locomotive that's never been on a dynamometer but whose drawbar pull is exactly eight grown men and two boys.

The only thing small is the scale. The

thrills are full-size. Side rods flash, and the stack spits black. You can feel the heat of the firebox on your face, and hear the labored chug on a long upgrade. You can smell the hot, moist pungence of live steam pushing up close to the safety limit, and the acrid odor of bearing oil running hot under a load many times the engine's weight. And all the time you keep your eyes glued to the rising needle on the pressure gauge.

There Are Breakdowns, Too

Then the heart-breaking moment when the crown sheet threatens to run dry and the boiler is in danger of blowing, or an injector valve fouls and the water pressure drops. Back goes the engine to the club's repair yards—the basement workshop of the club's originator, Vie Shattock.

Shattock, a Southern Pacific plumbing supervisor, got the idea for the club when he was tooling locomotives in his basement.



on Real Steam

He wanted an outdoor setting, where his engines would have light and air and space, and he wanted only members who loved steam locomotives well enough to build one.

Railroad Donates Timbers

Shattock asked his friends and turned up a handful who showed interest. The Eastbay Regional Parks Board came up with a site in Redwood Park just outside downtown Oakland. The Southern Pacific Railroad donated discarded rail ties and bridge timbers for construction of the big track.

Then the work began. Scott E. Gordon, present club president and professionally a railroad civil engineer, mapped the site. From his plans, the track took shape. A total of 147 wood piers rose on beds of crushed rock. Bridge ties became beams to support the track, and light aluminum rails were spiked down on slender wood ties.

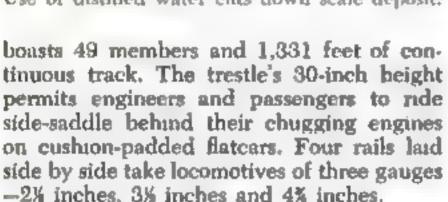
That was three years ago. Now the club



Special four-rail track takes three gauges of locomotives—2%-inch gauge for %-inch-to-the-foot scale; 3%-inch gauge for %-inch scale; and 4%-inch gauge for the big one-inchers.



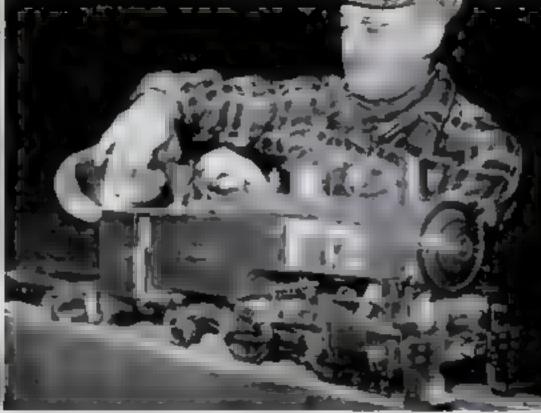
Tiny hoiler tubes must be periodically scraped elean with gun rod to keep them from fouling Use of distilled water cuts down scale deposit.



Down long straightaways and around



Aluminum rails are spiked down on eight-inch wood ties. Continuous 30-meh-high, 1,331-foot-long trestle is made of old railroad bridge ties, donated by Southern Pacific, resting on 147 piers.



Most models are reproductions, but this dockside switcher is an original design. It weighs 100 pounds, burns wood alcohol instead of coal,

carefully banked curves glide precision-built scale models of prototype locomotives—the big compound articulated Mallets, mountain-climbing Mikados, Pacifics, Hudsons, and the homely dockside switchers.

Engines Take Thousands of Hours

All of them run—there are no non-operating showpieces on this railroad—and they all run on steam. Normal running pressure is around 100 pounds, with the safety valve set to open at about 120. Boilers, usually made of brazed copper or welded steel, are first tested at 200 pounds or more.

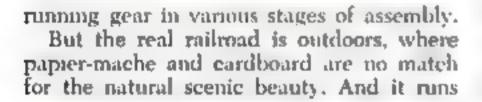
Most engines burn real coal, either crushed or in the form of briquettes, while a few burn alcohol. On most, all of the parts are fully operating, from the Johnson bar—which does for a steam engine what a gear-shift does for a car—right down to the sand domes and the steam-driven water injectors. And each represents a spare-time investment of 1,000 to 5,000 hours in the most exacting work with lathes, drill presses, hand files—and ten-thousandth-of-an-inch tolerances.

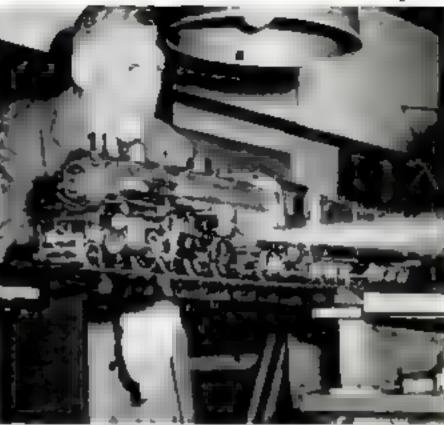
Indoor Tracks Test Locus

Inside Shattock's basement workshop are more examples of the railroaders' craftsmanship. An authentic reproduction of a track-side water tank fills a waiting New York Central "870." An electrically operated turntable reverses locomotives, while a round-house shelters a pair of 4-8-2 Pacifics flanked by a pair of 2-8-2 Mikados. Short lengths of test tracks, set up around the walls of the cellar, hold an assortment of engines and



Firing up. Loco gets help from small electric pump that draws air through stack to fan flames. Once fire is going, steam jet creates draft.

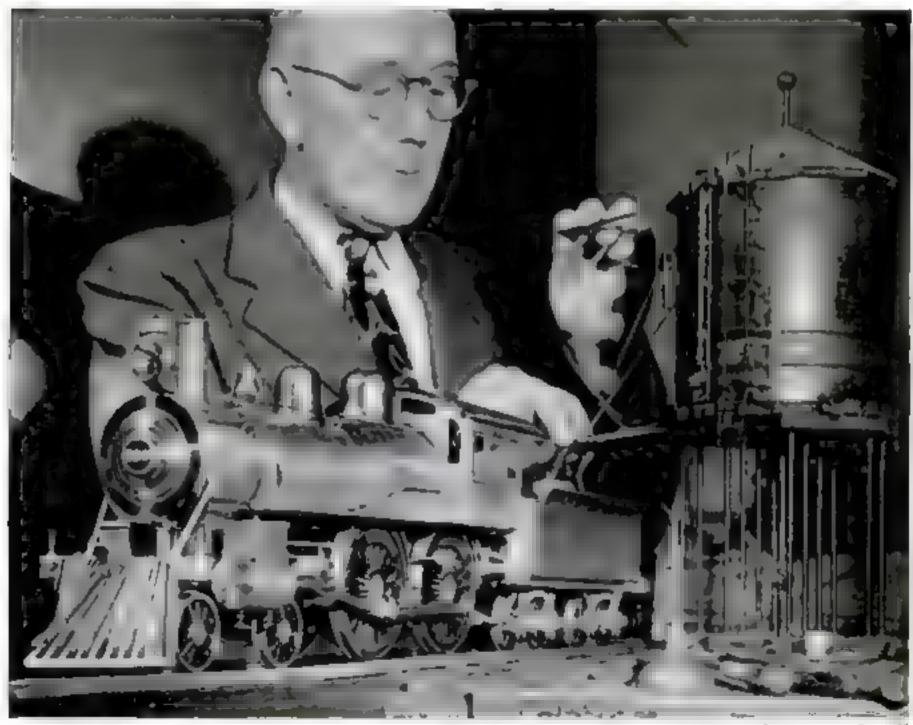




Ready to hit the high from, this mighty 2-8-2 Mikado blows steam as she gets up pressure. Throttle and steam-pressure gauge are in cab.

like any self-respecting railroad should—under its own steam.

Read how one man runs his mammath model railroad like a real road in P.S. next month.

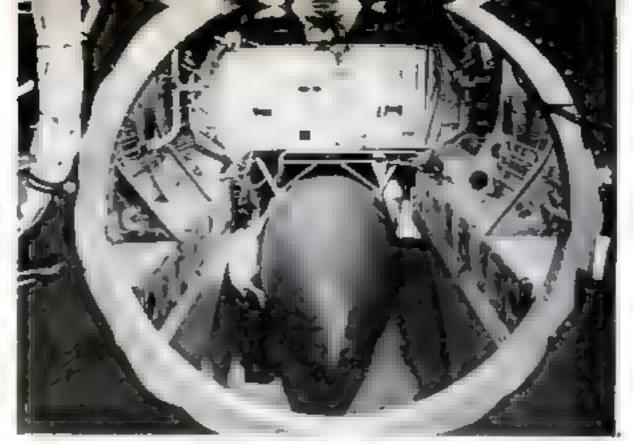


In cluh's basement workshop, famous old "999" takes on water from replica of familiar

trackside tank. Larger version of water tank will be built for use by members on outdoor track.

Big Bomb Tight Fit in B-29 Bomb Bays

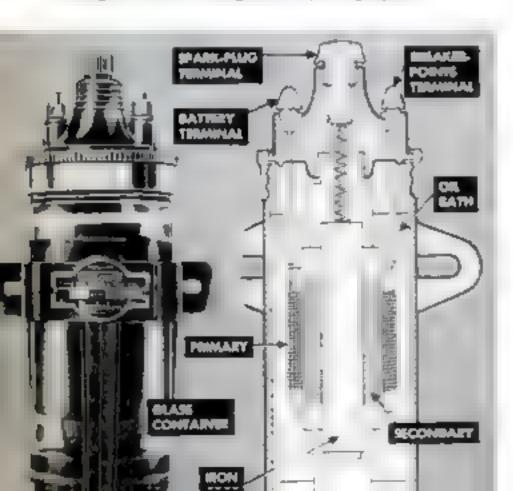
HERE'S a 44,000-lb. block-buster that's going to make an extra big hole in the ground when it's dropped for real. So large that it takes up space in two bomb bays and still sticks out of the plane, the giant bomb is shown at right attached to the specially designed cradle needed to hold it aboard a Boeing B-29 Superfortress.





Stapler Fastens Building Rods

Steel rods for reinforcing concrete are usually wired together laboriously by hand. Now a new German-made machine does the job at the squeeze of the hand-just like using an office stapler to join papers.





Nutshells Power Taxicab

SPAIN's answer to the scarcity of gasoline is—Nuts. Shells from the plentiful almond are being burned in converters to provide a combustible gas that can power automobiles like the taxicab above.

Oil Cools Auto Ignition Coil

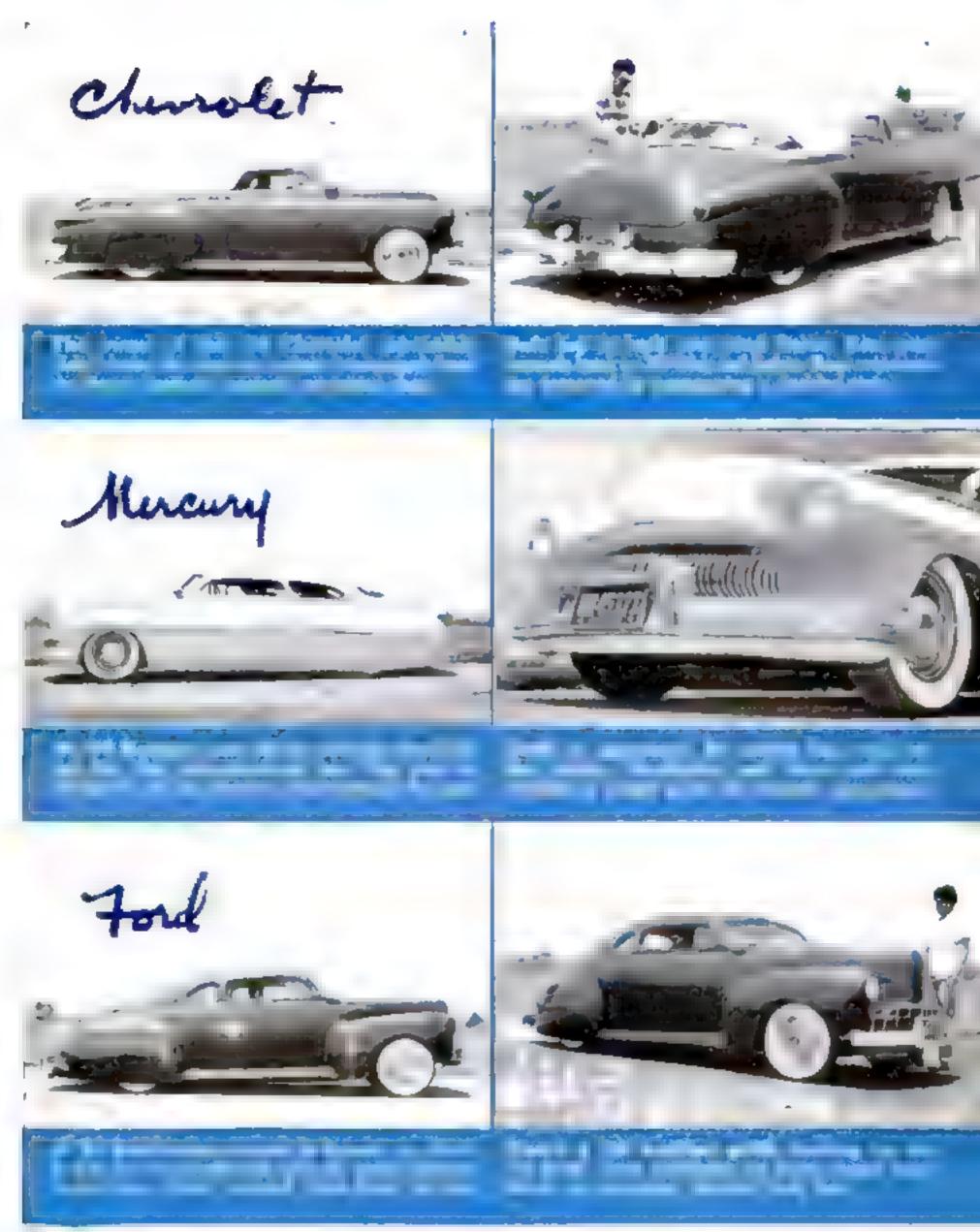
This new auto ignition coil is insulated and cooled by circulating oil, just like giant transformers in power stations. The oilbathed windings are said to produce higher voltages, with a hotter and fatter spark at the plug gap. This improves acceleration and starting and increases gas mileage by firing fuel mixtures that might otherwise missire or refuse to ignite at all

The outer covering is tough transparent glass, which reduces electrical losses metal containers sometimes cause. Oricoil, made in England, is sold in this country by Harry H. Lederer Co., Los Angeles.

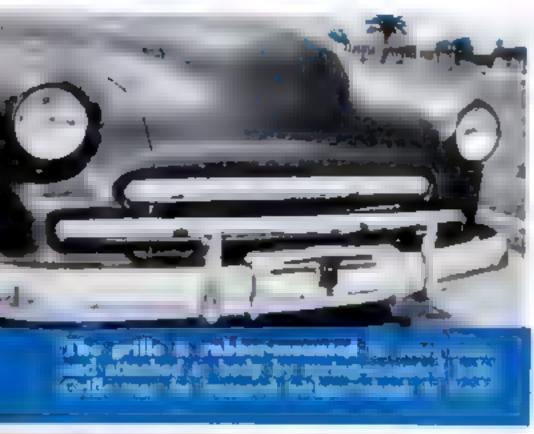
144 POPULAR SCIENCE



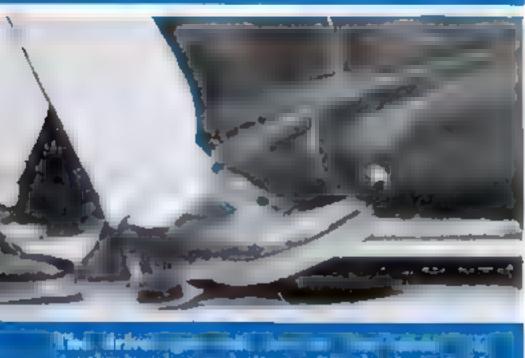
These Cars Are



Tailored to Order







When the Barris brothers redesign a car to look like what it isn't, they add luxury lines and gadgets galore.

By Andrew R. Boone

TAKE a good look at the photos at the left and you'll see why car identification might become a guessing game along Southern California highways. When a Mercury body on a Ford frame powered by an Olds Rocket engine zips past, even the experts are likely to give it a double-take.

What is it? It's a Barris car.

The brothers Barris, George, 24, and Sam, 25, perform their auto alchemy in a shop at Lynwood, a suburb of Los Angeles. If you were to pay them a visit, you'd find a small garage jammed to the walls with cars in all stages of repair, from a wrecked and burned Ford to a gleaming Cadillac receiving its final gloss. You might recognize the battered Ford, but the chances are good that you'd never know the Cad. The brothers pride themselves, when turning out what they call a Barris Kustom Car, in creating a design so individual in appearance that even its original maker wouldn't recognize their re-creation.

Business Born in High School

It started 10 years ago when the two brothers, then students at San Juan High School in Sacramento, became dissatisfied with the lines of their knockabout Ford coupe. Laboring after school and week ends, they changed its body into something that sent their pals into a rave of teen-talk superlatives. That decided them to turn their hobby into a business.

The next decade was a busy one for George and Sam. During those 10 years they have:

- Restyled more than 1,000 cars, each different from all the others.
- Made both removable tops and removable windows in a variety of styles.
- Devised push-button mechanisms for



Here's how customized '49 Mercury shown on preceding page compares with a stock model of

the same viotage. Reworked job is lower, narrower Body clears road by only three inches.



Teamwork does it. While George Barris works on a cutaway drawing for the underearriage of a sports-car conversion, brother Sam stands by figuring out best way to do the shop work.



Unusual combination is discussed in conference with customers. '50 Mercury body on '50 Ford frame is what they want. An Oldsmobile Rocket engine will power the sleek speedster.

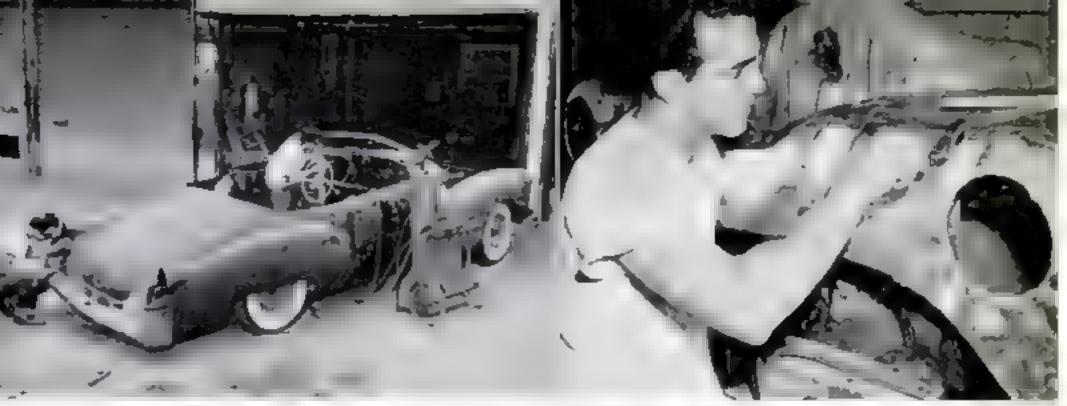
electrically opening hoods, doors, windows and trunk compartments.

- Built novel and handsome floating gnlles.
- Produced flowing, ground-hugging designs that have become the trade-mark of their design and workmanship from coast to coast.

A Barris job may start with any heap of junk-perhaps little more than a chassis, engine, drive and gears. Their work begins not with metal forming but with drawings. That's George's department. High-school

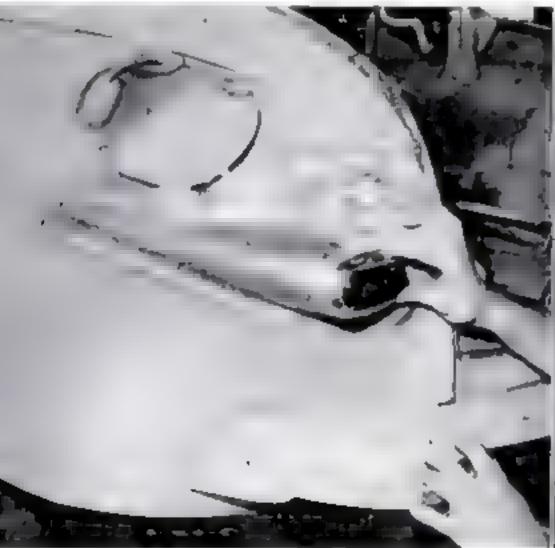
training in art and mechanical drawing and a facility for expressing design ideas quickly enable him to put on paper both pictures of the completed car and cutaway drawings of individual sections. The owner learns in a jiffy whether he will like George's proposal.

Most important ingredients in their prizewinning creations are design originality and workmanship. More than 50 trophies, awarded at auto shows for design, style, beauty and workmanship, attest their skill



A conversion job gets the works. This '41 Buick convertible has been lowered 14 inches. Cadillac fenders, lengthened four inches, have been raised on body to give road clearance.

George molds and leads newly created panels for grille and sealed headlights, using a hick-ory paddle that he slides gently across soft lead kept warm with a blowtorch.



Glass is installed in a tail light that has been welded onto side of rear fender. Extension was formed out of same kind of cold-rolled steel that is used for body building.



Bare metal must be really clean or paint won't stick. Here Sam uses coarse-tooth file. He'll follow with rotary grinder. Then come sanding, priming, painting, glazing, waxing.

and ingenuity. And there's no great secret to their success.

"Make 'em look good and keep 'em close to the ground," is the Barris formula. Neither George nor Sam goes along with the goop-and-gingerbread school. You'll see no foxtails and very little chrome on their cars. No pipes extend from Barris recreations, and radio antennas are all but hidden in a bumper or body. Seldom does a handle appear on the doors. The driver pushes a button, and electricity or the vac-

uum system takes over. Sometimes there's a luxury and hot-rod combination, like a '41 Ford convertible with a racing engine. It gets up to 93 m.p.h. in a quarter mile from a dead stop.

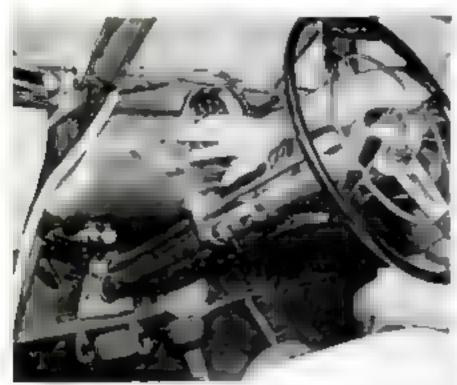
"Channel and drop" is a by-phrase in their busy shop. Customers, mostly among the younger set, want both novelty and low lines. The top may be lowered, body narrowed, fenders lengthened, wheelbase shortened. Even on a minor, superficial changeover, the brothers make certain that some



Three rear windows of customized convertible are easily taken out by unsnapping a padded strip, as above. On some jobs windows are part of the top, but can be unscrewed for removal.



This cylinder once lifted the top of a '41 Chevvie convertible. Now it raises the trunk lid of a converted '49 Chevvie. It operates off vacuum manifold through a three-way switch.



Push buttons on dash at left of steering wheel operate pneumatic controls that automatically open doors, raise hood and open trunk cover. On some jobs, controls are hydraulic.

feature differs from those found on all other cars. It may be no more than a streamlined tail-light bracket.

On a major redesign, Sam strips the car down to its skeleton. New fenders are formed. Altered components are rewelded. Sam cuts down or builds new doors, painstakingly fitting them. George fairs in adjoining metal with lead. Sam reams out all holes, fills them with braze metal, shrinks the plugs in tightly, files all spots for painting.

Together, Sam and George finish the interior. A chrome-and-red-plastic dash goes into a Chevvie coupe; two-toned upholstery, piped and rolled, into a Merc convertible. Painting comes last, but this is by no means the least part of their efforts. Guide coat, sanding, two coats of sealer, 25 paint coats (each block sanded), frequent rubbing, final glazing and waxing.

Show Cars Must Shine

It all adds up in cost, but both George and Sam insist upon plenty of paint. Many of these beauties are entered in shows. Only an adequate protective body can withstand the repeated polishing that grooms a car to prize-winning luster.

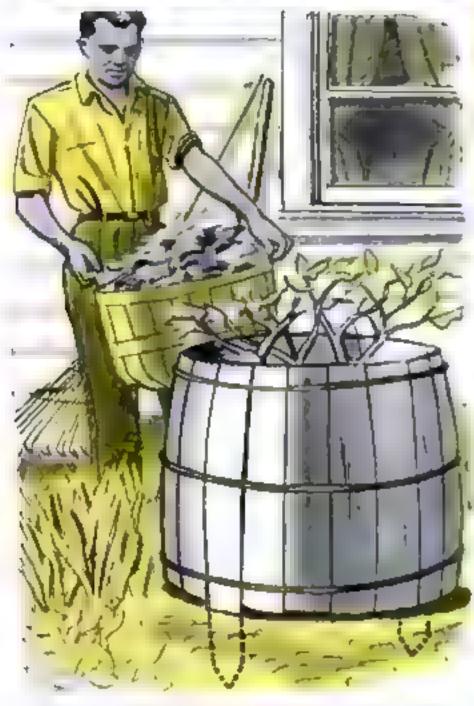
As the idea man, George prides himself on a hatful of new wrinkles. He sported curb feelers on his first car, 10 years ago. Soon he began slanting tops downward toward the rear to achieve sweeping lines. But too much sweep can become monotonous. So he adds twin spotlights on front corner posts to get a two-step appearance. On many cars he removes the drain-mold system, relying upon tight door fits to keep the water out.

Buick Has Built-in Bar

He's especially proud of a converted '49 Buick. A complete cocktail har slides out from the rear seat at the touch of a button. The boys plan a superdooper Caddlac. Today it stands in an out-of-the-way garage, gutted by fire. Refurbished, the Cad will carry all-pneumatic controls, a rear-seat har, a television set recessed in the front seat and a pair of wheels on stilts that can be lowered to raise the low-slung rear body over sharp dips in the highway.

As new ideas come along, George will sketch them, Sam will execute them. That's the way these designer-builders already have achieved success in a business that demands lots of talent and enterprise. END

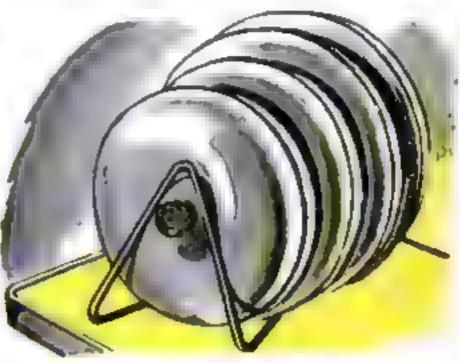
Keeping the Home Shipshape



Nail kegs will protect small shrubs from winter frost damage. Saw off the lower third, but leave two opposite staves full length. Point these so that they can be embedded in the ground.



Use a clean oil can to feed hauid medicines to a pet. Squirt the medication into the back of pet's mouth, if open; or squirt it in at the side if you can't open the jaws.



Pot lide stock neatly and conveniently in a wire napkin rack. Stand it ready at hand on a counter top or mount it on a suding board in a kitchen cabinet.

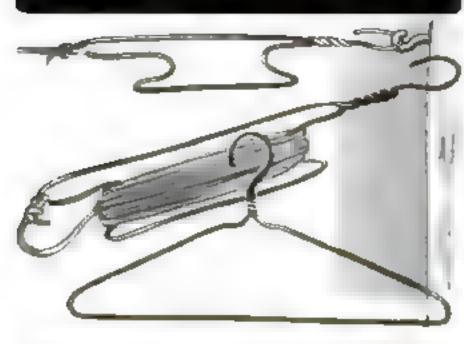


You won't have to stoop so far to pick up sweepings if you make a simple change in the handle of your dustpan brush. Cut it off, then replace at an angle as above.

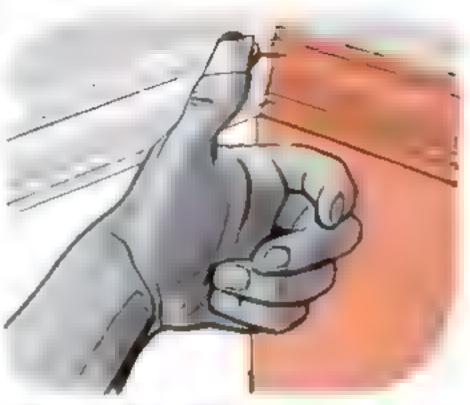


If you have a home freezer, save empty milk cartons. They're fine containers for freezing all kinds of foods. Slice off the top so that it can be replaced and sealed with tape.

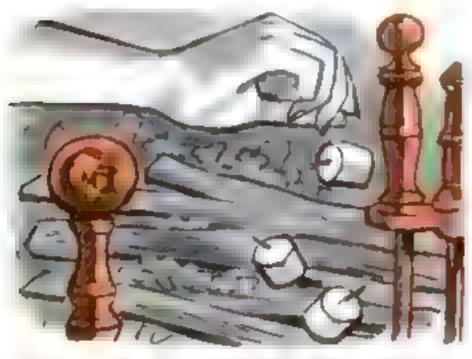
Keeping the Home Shipshape



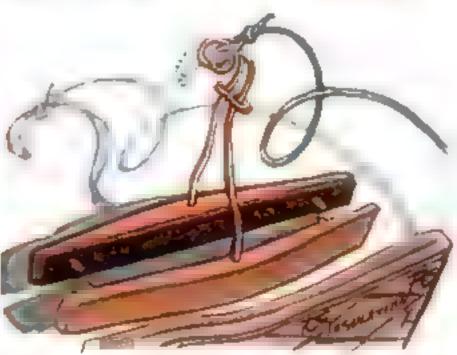
A clothesline reel that's handy for light laundry can be made by bending a heavy-wire hanger. Put a hook on the opposite end of the line to eliminate tying and untying.



When hanging party decorations, you can push tacks into corners where your hand won't ht if you wrap tape around your thumb, sticky side out. Tack heads will ching to the tape.



Old candle ends thrown in the fireplace or furnace will make it easier to start your fire. Paper and kindling will ignite the wax, which will help wood or coul eatch fire faster.

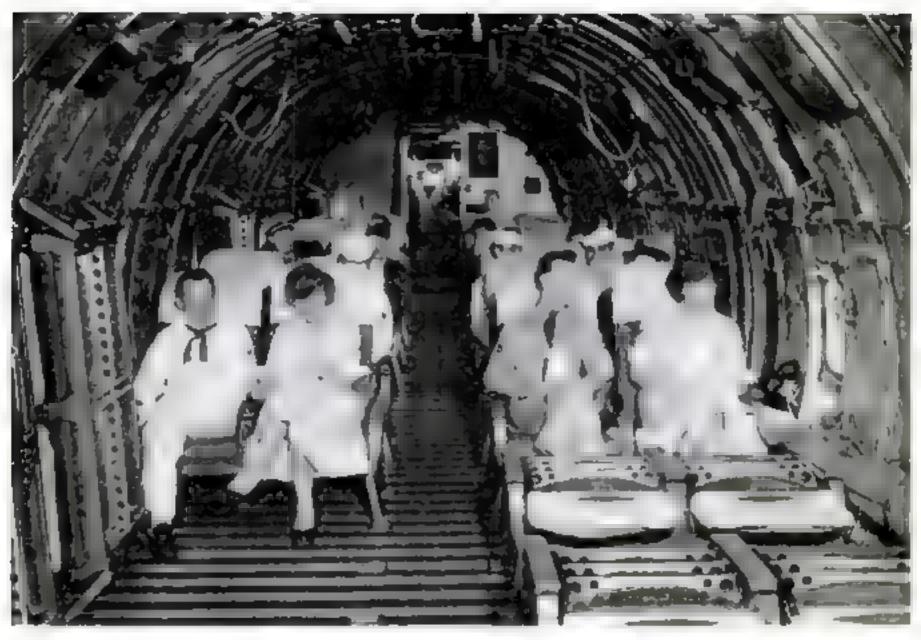


To fish insulation batts through a finished wall, try using a trouser hanger as your hook. You can make it grip tightly by driving two brads through each side of the hanger.



Heavy plastic place mats make attractive and long-lasting splash guards for use behind kitch-

en and bathroom sinks. Attach them to the wall with cement or decorative tacks.



Airplane Seats Face Rear

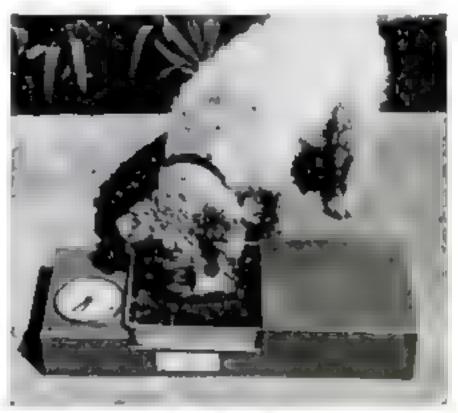
THE front of this Boeing C-97 transport is behind the passengers, who face the tail of the plane. Rear-facing seats, long favored by safety experts because they provide extra support for head, shoulders and body in the

event of a crash, have now been adopted by the Military Air Transport Service for all its new planes. When the seats aren't in use, they can be folded flat, as in right foreground, and then against the cabin walls so that the space may be used for cargo.



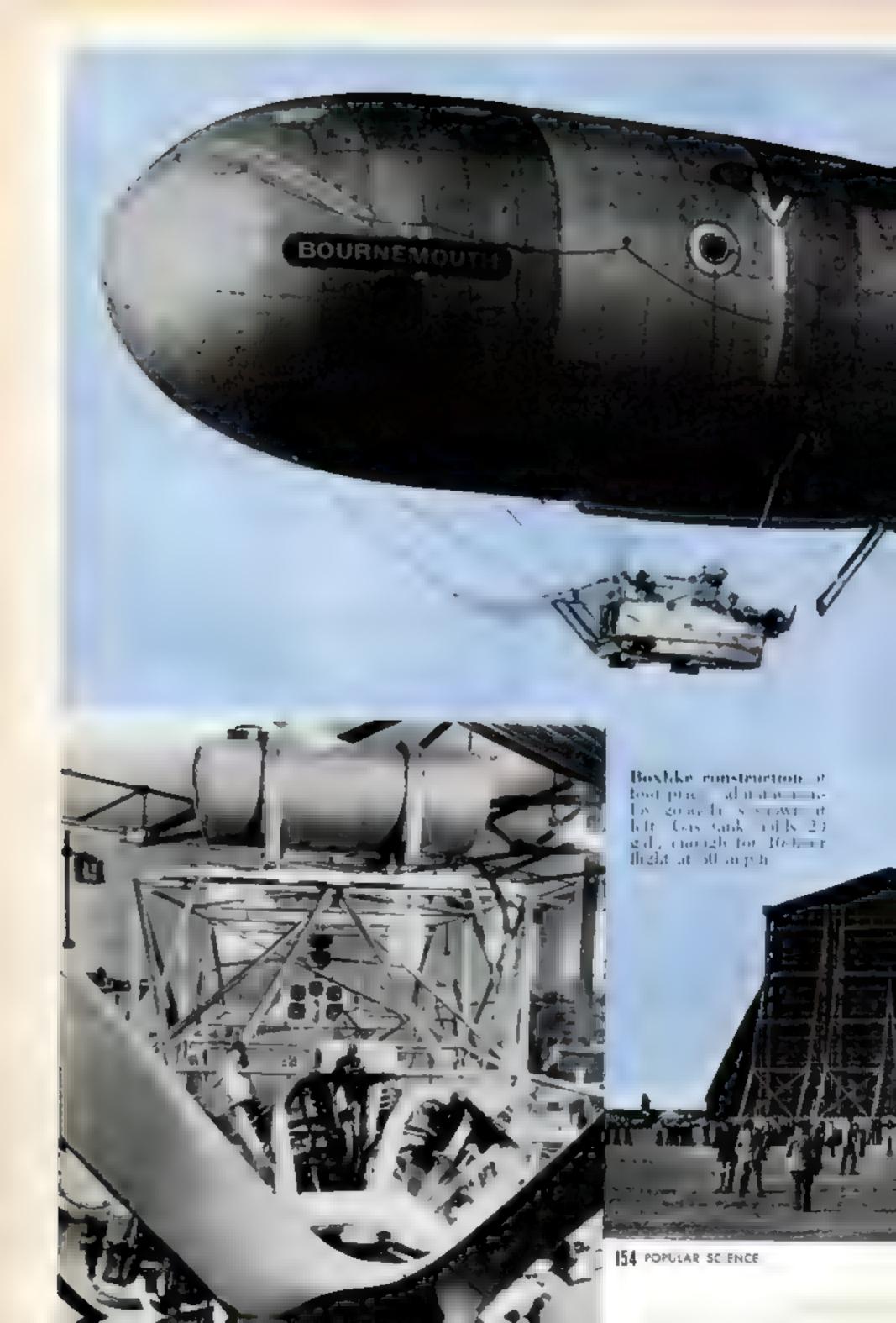
Biggest Prism Weighs 300 Lb.

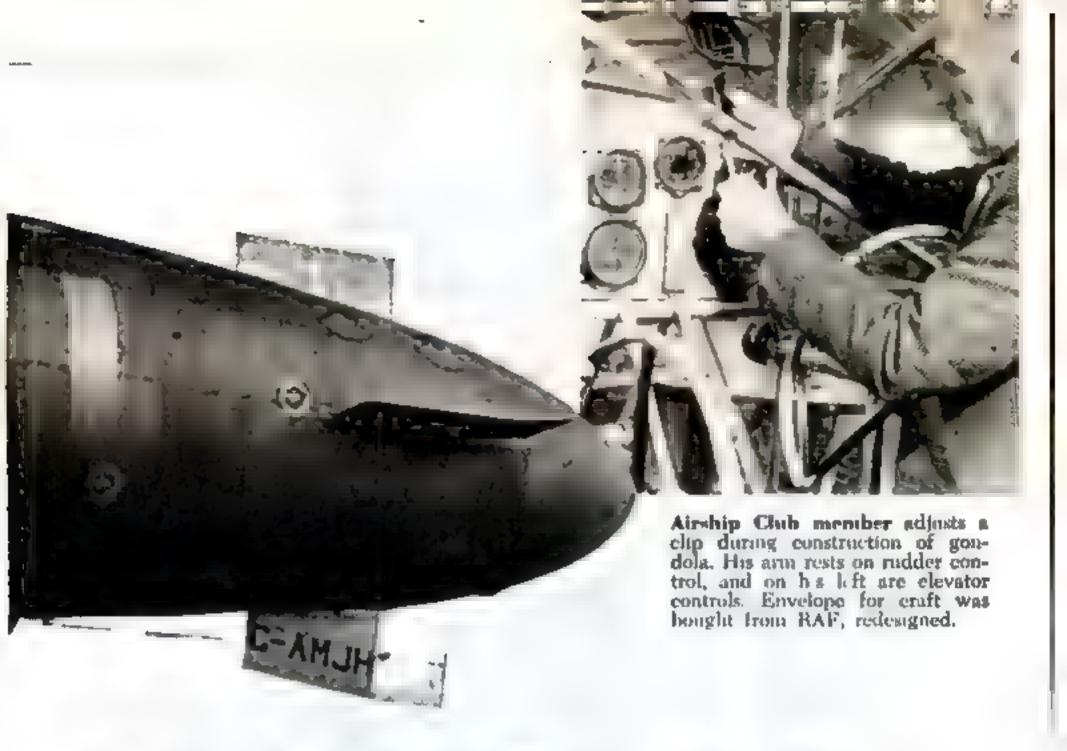
This 300-pound piece of glass, said to be the world's largest prism, is 33 inches across. Its two faces were ground within two-millionths inch of perfect flatness by the Perkin-Elmer Corp. for a telescope at the Harvard Observatory in South Africa.



Clock Feeds the Dog

SET the clock in the feeder above, and when chow time arrives the food pan slides out of covered section at right—ready for hungry Fido. To make sure he knows dinner's on, a bell rings at the same time. It's made by Evernu Products, San Francisco.

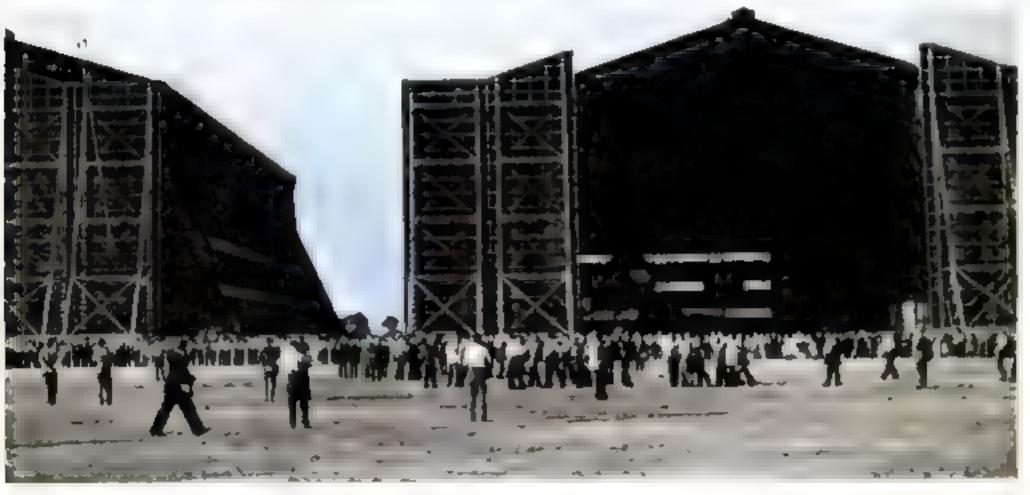


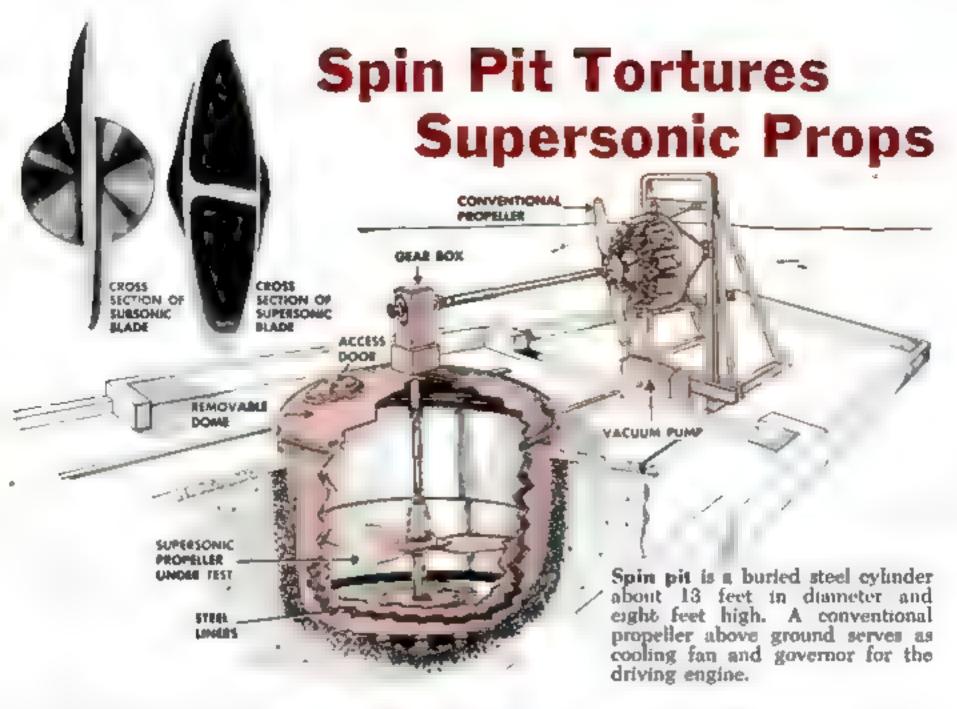


They Built a Blimp for Fun

THE 250 members of the Airship Club of Great Britain designed and built this blimp, the Bournemouth, with \$7,000 of their own money. It's the first such airship to be made in England since the crash of the R101 in 1930. The nonrigid bag is 108

feet long, 27 feet in diameter and holds 45,-000 cubic feet of hydrogen. A 75-hp, engine drives its propeller, and it does 45 m.p.h. Shortly after these pictures were taken, a tow rope caught on a building and the gas bag was torn, but no one was hurt.





BURIED in the ground at Dayton, Ohio, is a new kind of laboratory—one that tests propellers designed to fly planes faster than the speed of sound.

The world's first supersonic-propeller spin pit has just been put in operation by the Aeroproducts Division of General Motors. In it, props are whirled at superspeeds to see what kind of stresses they develop. Contrary to the belief generally held a few years ago,

it is now thought that propellers—as well as jet engines—can be used to drive airplanes through the speed of sound and beyond.

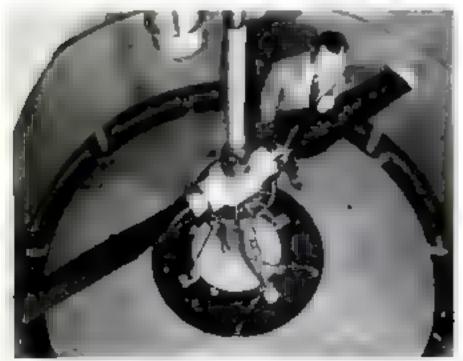
Built to hasten research on the shapes of such propellers, the spin pit has a vacuum pump that enables the operator to simulate various atmospheric pressures under which the propellers will operate at high altitude. And with reduced atmosphere, low horsepower can spin props at high r.p.m.

Conduit-Box Tabs Make Washers

LARGE washers with small holes are not always easy to find. I make my own from the round metal tabs that electricians punch from conduit boxes. When I need a washer, I select a tab of the right size from my collection and drill a hole through it.—J. C. Branstetter, San Francisco.

New Drug Is Stronger than Morphine

A NEW pain-killing drug, said to be more powerful and longer-acting than morphine, may help make this country independent of foreign sources of opiates. A synthetic, Dromoran, or 3-hydroxy-N-methyl-morphinan, was first produced by a German chemist, Dr. Rudolf Grewe. Closely related to morphine, it is habit-forming.



An engineer inside pit checks an electrical pickup that indicates stresses propeller is subjected to during test runs. The prop blades shown here are of conventional design.





New Sprayers Walk and Crawl

These two extremes in new weapons for the war on bugs were demonstrated recently at an international agricultural conference in London. The donkey packs a small gasoline engine hooked to a fan that blows dust from a hopper through three flexible pipes tipped with double-barreled nozzles. The motorized sprayer at right, built on a narrow-gauge crawler tractor, has a glass-windowed cab to protect the operator from noxious mist laid down by a battery of jets in the rear. It carries 200 gallons of liquid insecticide or weed killer.



British Jet Tries New Wing

Latest product of Britain's research in jet planes is this H.P. 88, shown after completing its first test flight. The high-speed prototype sports an experimental wing and is powered by a Rolls Royce Nene turbojet engine. It was built jointly by Handley Page and Blackburn and General Aircraft.



Sky Chef Serves Bomber Crew

THE old Air Corps was never like this. Aboard the B-36 superbomber a two-burner electric stove with built-in icebox brings some of the comforts of home to crews on 30- to 40-hour missions. Crew in forward compartment will receive hot food by means of a conveyor belt that travels through the 85-foot communications tunnel. Other features intended to increase crew effectiveness and prevent fatigue are lavatories with washbasins, hot and cold running water, and even shaving mirrors.



GI Truck Gets Automatic Drive

By Herbert O. Johansen

EVEN the Army's worst driver would find it hard to snafu a convoy with this six-by-six. I came to that conclusion after a preview drive in the new military super-truck over the ruts, bumps, bogs and 60-percent grade (photo at top left) of the Billy Goat course of General Motors' proving ground at Milford, Mich.

Anybody who can operate a steering wheel can run this job. Hydra-Matie transmission, with eight speeds forward and two in reverse, does the job of gear selection almost automatically even in the toughest battlefront terrain. On the highway, power goes only to the two rear axles. But when the truck suddenly hits rough ground, causing the rear wheels to lose traction, power is automatically applied to the front wheels.







One lever does the work. Shown in its different positions above, it handles all transmission control. Engagement of front-wheel drive is auto-

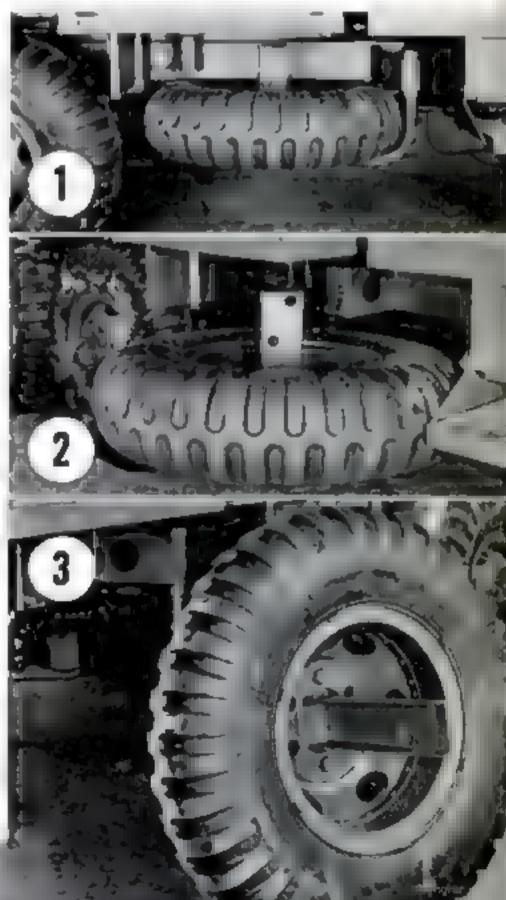
matic. Only choice driver has to make is selecting high or low range, "level" or "hilly" in either range.

A new six-cylinder (302 cu. in.) engine, developing 145 hp., gives the GM six-by-six (meaning six wheels, all six power-driven) a top speed of 58 m.p.h. under a five-ton load. And with a full load, it can tow a five-ton 155-mm. gun behind it.

Snorkel devices enable the M-135 vehicle to make like a submarine. While older models could be adapted for underwater rides, the new truck has the sealed transfer case. transmission and the rest built in. When about to submerge, the driver flips a switch, forcing compressed air into these units to keep them bone dry.

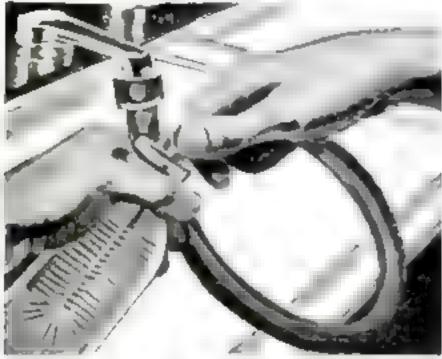
Another improvement is torque-rod suspension in combination with regular leaf springs. These rods let the axles move up and down, but not forward or rearward. The result: a smoother ride and rabbit speeds over mountain-goat country.



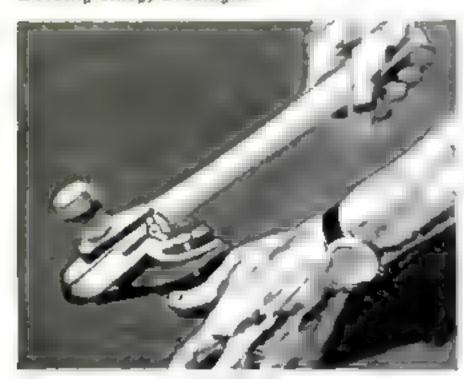


l'd like to see them make...

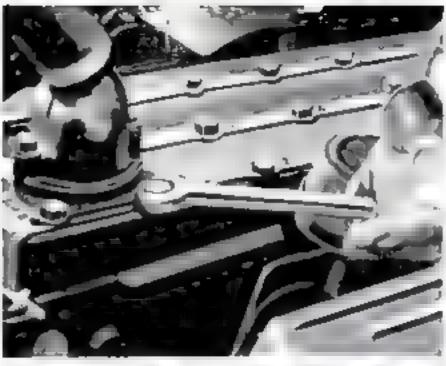
Everyone has his own pet idea of some gadget he would like to see in general use. What is YOUES? Popular Science will pay \$5.00 for each one published. Use government personals only Contributions tannot be acknowledged or returned.



A bottle-washing brush that attaches to the faucet and is rotated by waterpower. Add a built-in soap feeder so soapy water would squart out through holes around the bristles.—Mrs. Dorothy Riley, Brooklyn.

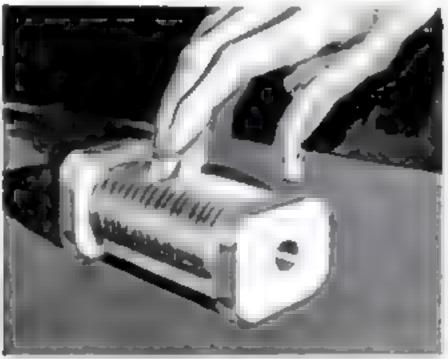


A hammer with a U-shaped rocker fitted over the head and fastened with wing outs. Adjusted as a fulcrum for the head, it would give leverage for pulling nails, eliminating need for a block. —Arthur Ammann, Brooklyn.



Automobile cylinder heads with holt holes numbered in the order in which the bolts should be tightened. Proper tension for tightening nuts and spark plugs could also be indicated.

—George A. Jacobs, New Haven, Conn.

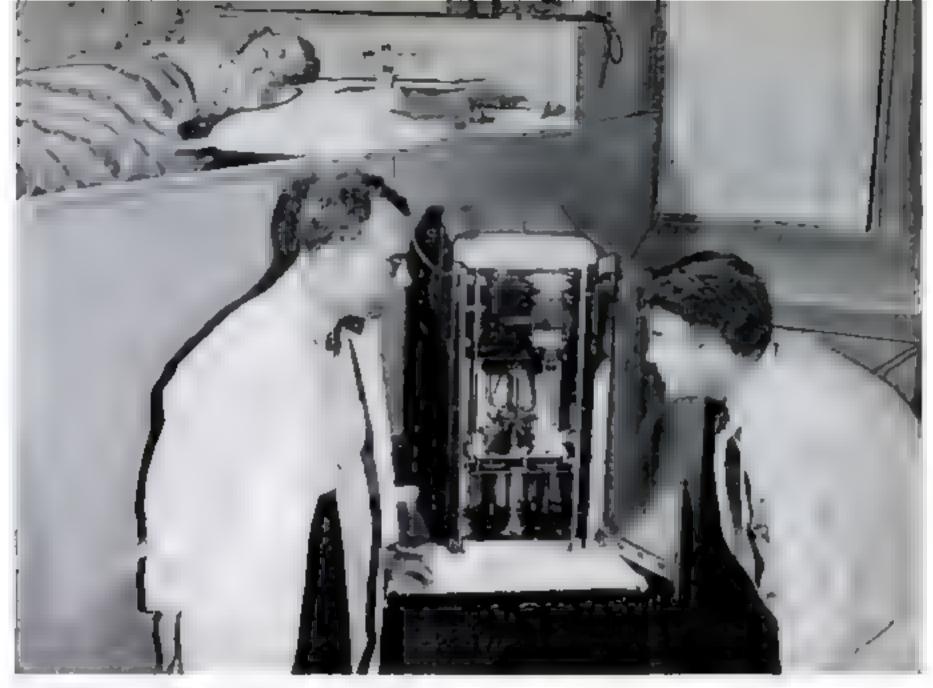


Square flanges on spools of sewing thread, magnet wire, and the like. If you dropped such a spool, it would stay put instead of rolling out of sight and unwinding its contents on the way.

—Martin Reddoor, Poplar, Mont



Putty in collapsible tubes with triangular neck openings. The putty would be extraded in a triangular strip, ready-shaped for application in the glass rabbet of window sash.—H. Wadron, White Plains, N. Y.



Fast Separation Preserves Blood

A surrease-size blood refinery can now separate whole blood into its life-saving components while it is still flowing from the donor. This on-the-spot processing prevents enzymic action that causes blood to break down, and may thus make it possible to keep blood fractions fresh much longer (see PS, Sept. '51, p. 147).

The portable fractionator, a pilot model,

has been developed by Dr. Edwin J. Cohn, of Harvard, and by engineers of the American Optical Company. Blood flowing from the donor's veins goes through a tube that first removes calcium to prevent clotting. The blood is then cooled and enters a rapidly spinning centrifuge that separates the red cells from the plasma and automatically transfers each to its own sterile mutainer.



Scorpion Shows Its Fangs

THE Northrop F-89 Scorpion, America's "basic defense aircraft," shows some of its stinging power as it unleashes three of the 16 five-inch rockets tucked under its wings. The Scorpion, whose armament was re-

cently revealed for the first time (PS, May '51, p. 143), also carries six 20-mm. cannon. Twin Allison J-36 turbojet engines, side by side under the fuselage, power the 15-ton plane. Scorpions are now in service with Air Force units on the West Coast.

Felling timber hasn't been mechanized in the forests of the Austrian Alps. Here an old forester takes a sight along his ax handle to determine how a hig spruce is going to full.

Trimmed logs are chained together for loading. Previously, timber cut in spring would wait for winter snows to be slid down mountain slopes. Oxen helped part of the way.

Power Mule Speeds Logs to Sawmill

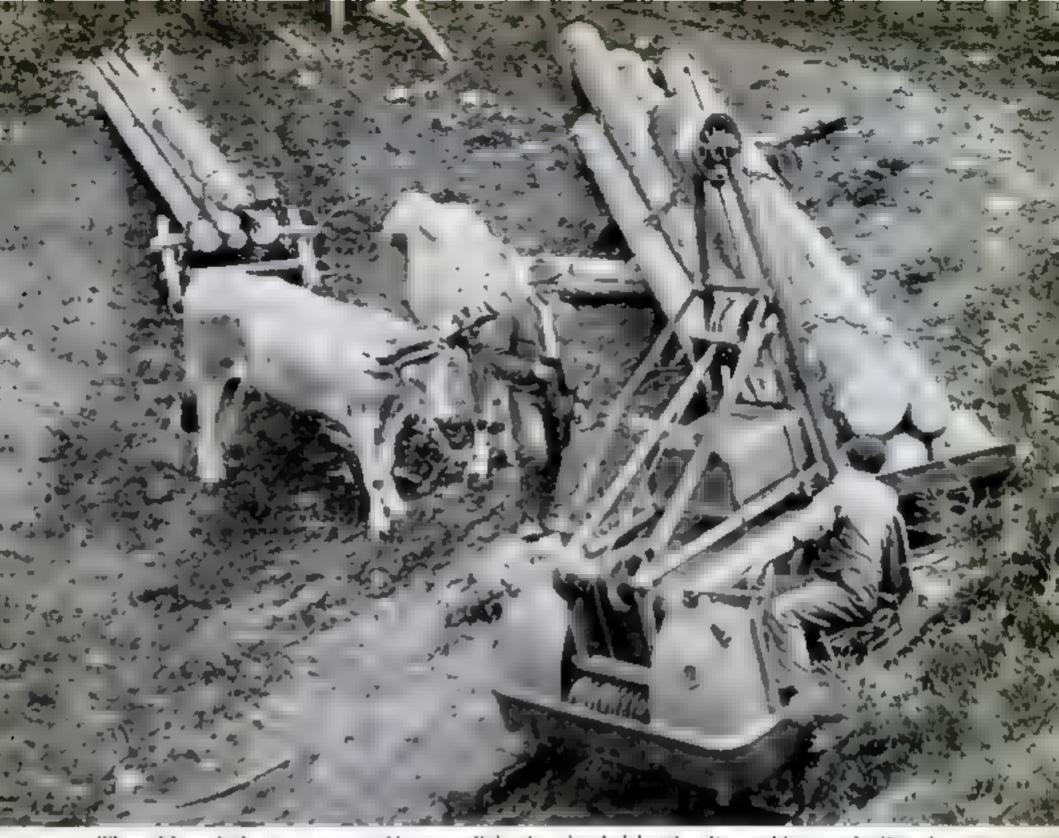
EXPERT woodsmen of the Austrian Alps can fell a giant spruce in less than half an hour. But it used to be many months before the logs reached the nearest valley sawmill. That was before Oskar Hacker's Motor-

muli cut the time to a single day.

Engineer Hacker was appalled when he discovered that Austria's backward timber industry left spring-felled trees lying on the mountainsides until winter, when they could be slid down on the snow. An obvious job for tractors, he thought. But ordinary tractors were too heavy and wide for winding, roadless Alpine slopes, so he sat down to design one for the job. Some 2,000 drawings later he had what he wanted. Local manufacturers, however, didn't want what he had. Then a representative of the U.S. Economic Cooperation Administration saw his plans, put up the money, and Hacker's Motormuli was born.

Built-in winch pulls log load onto trailer. Most of load weight is dragged. A turntable, rotating on a spherical joint, enables tractor unit to negotiate tortuous mountain trails.





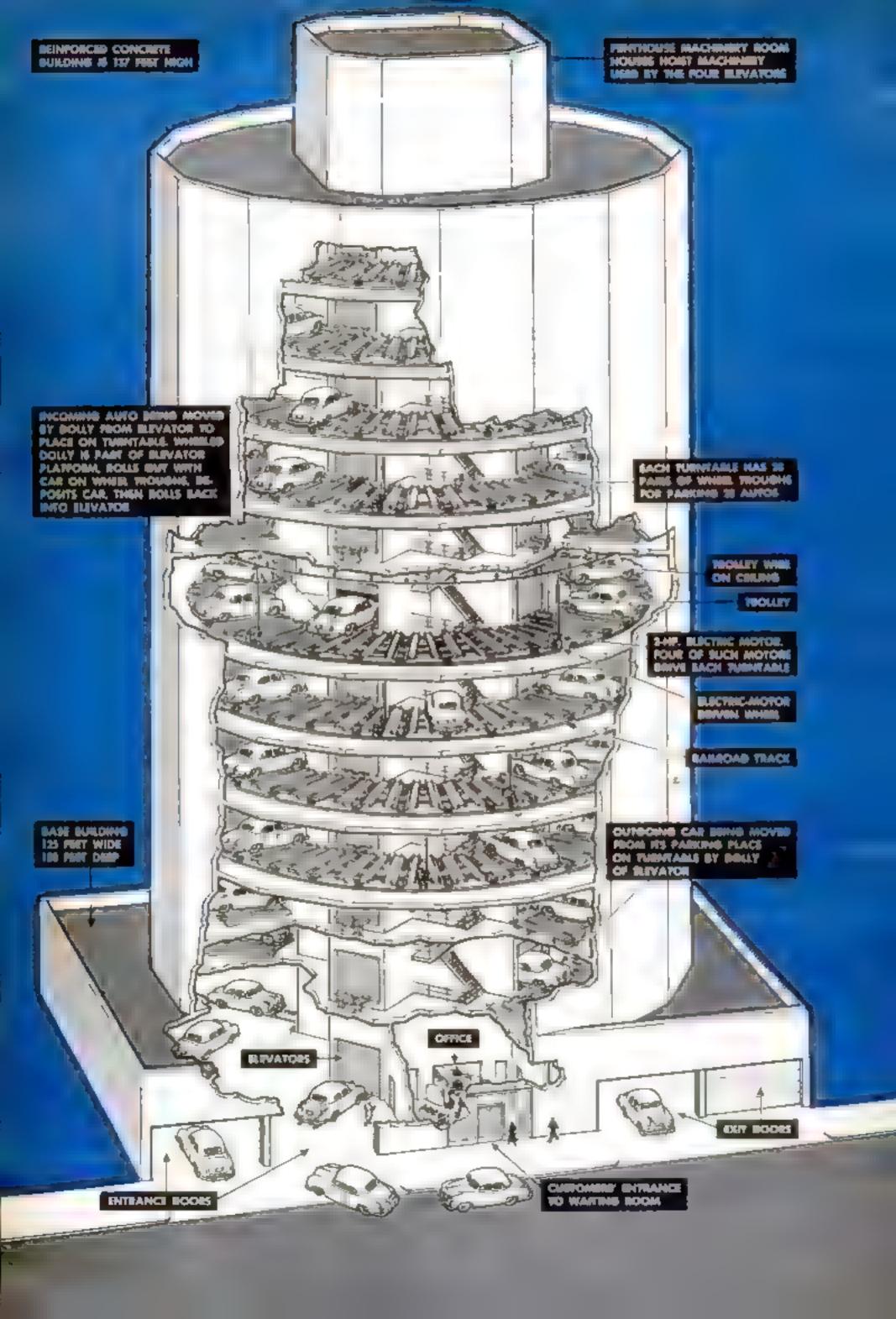
The old and the new meet. Note small load beland oven compared to five tony of logs being

Village audience greets Motorialis at valley

harded by the 35 ton Motorisuli Diesel engine is a four exhibiter 60-np. Steve

timber stands. Rear tractor is smaller version, with two-cylander channe of 26 hp.





"Merry-Go-Round" to Park Cars



IF YOU'VE ever wheeled 'round and 'round the block searching vainly for a place to park your car, where Sam Spade himself couldn't track down a spot big enough for a junior-grade scooter to squeeze into, take a look at this. It's the Rotogarage, latest answer to the parking problem in traffic-jammed city streets.

This multi-story automatic parking tower, its designers claim, could accommodate 400 cars on a plot 100 by 125 feet—seven times as many as a parking lot of that size.

Rates will be about the same.

Here's how the Rotogarage works: The parking floors are turntables, stacked like a platter of pancakes on a central column of four elevator shafts. You drive in on the ground floor, stop your car in front of one of the four elevator doors, cut the engine and get out.

A dolly emerges from the elevator, lifts your car a few inches off the floor and pulls

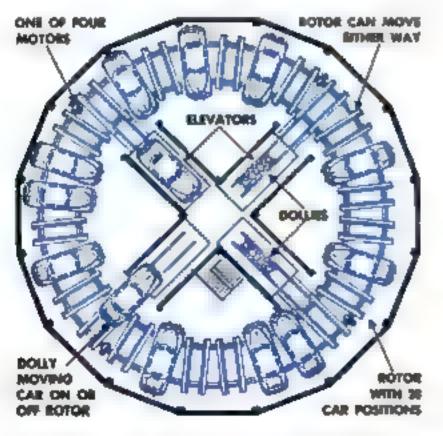
it into the elevator, which carries it up to one of the rotor floors that has an empty slot on its turntable. While the car is rising, the turntable is rotating to present its vacant spot in front of the elevator door.

The elevator stops and the doors open, turning on a floodlight. The dolly runs your car out and deposits it on the turntable. If another auto has been called for, the elevator takes it down on the return trip.

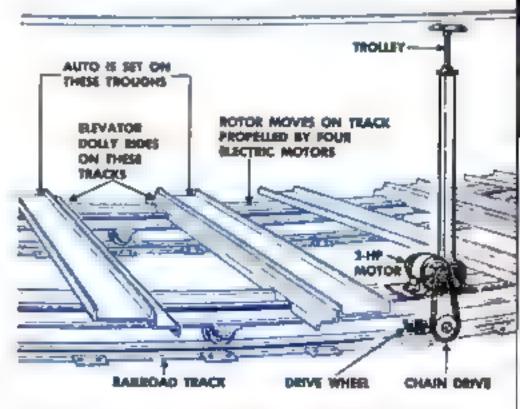
Average elapsed time from the opening of the elevator doors to receive a car until the car is stored and elevator returns to ground floor; one and one-half minutes.

Since its construction conforms to the standards of the Federal Civil Defense Administration, the Rotogarage would also serve as an effective bomb shelter in case of atomic attack.

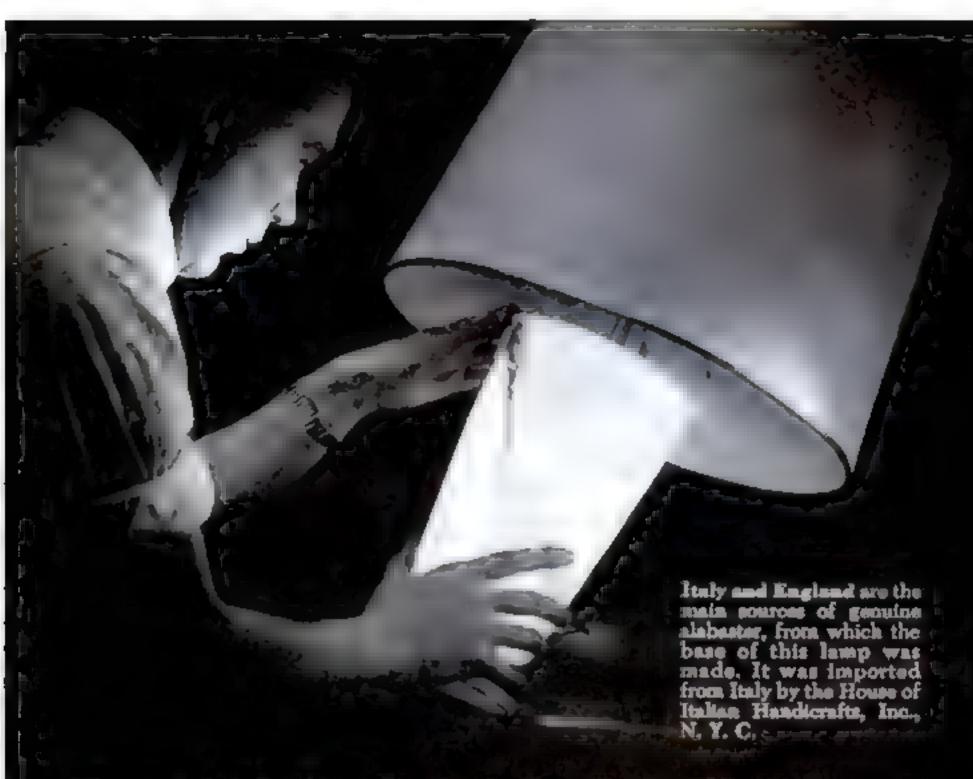
Towers are being planned, by Rotogarage Parking Units Co., for New York, Boston, Washington and Philadelphia. END.



Floor plan shows method of operation. Rotor, encircling four elevators, stores 28 cars, with three more in dead space between elevator shafts.



Rotor revolves on tracks, chain-driven by four electric motors mounted on outer rim. Each motor is powered by a trolley stick that rides against an overhead power line.



Television Lamps Dug from Ancient Mine

me, is new being out to an up

THE Romans didn't have television in alabaster from the hills in Staffordshire, England, some 2,000 years ago. They made the translucent white atone into a variety of ornaments and statues.

Today the soft stone is being used for special table lamps good for their warm, soft glow when the television set is turned on. Helps you keep your eye on Junior when he wants to shoot TV cattle gustlers with his new air rifle. ...

The huge blocks are quarried in this eld mine under a hill heneycombed with mine

galleries since Romen times. Carefully mind when they first began digging , worked from the rock face, they are moved to the factories where the blocks are sawed into more manageable shapes.

The smaller chunks can be turned on lather as easily as wood and can be cut, sawed, ground and polished.

The fragile stone is easily scratched and needs some care in handling, but finished articles of alabaster-book ends, lamps, lamp shades, clocks, pawder bowls, cignnotte besse, sek trays and a heat of other products—are safely sent through the world today as alabaster has been for conturies.



At the factory freshly mined alabaster blocks are sawed into convenient sizes. The stone can be sawed like wood but needs a little more

patience. The smaller, more easily bandled proces then go to the workshops to be carved or cut into slape



A circular saw, tipped with Carbor and and bathed with water cots the stone into slabs. The workman is halding up a fresh-cut slab to the light to show its translucence and brown vening. Some alibester is pure white, and it all has a "hight" appearance



You can turn alabaster on a lathe. This "Kerver or cover has been at it for 40 years, shaping the stone into Luidreds of designs. Many of the lamps reproduce the designs of ancient Greek vases. The white dust is gypsum, of which alabaster is one form.



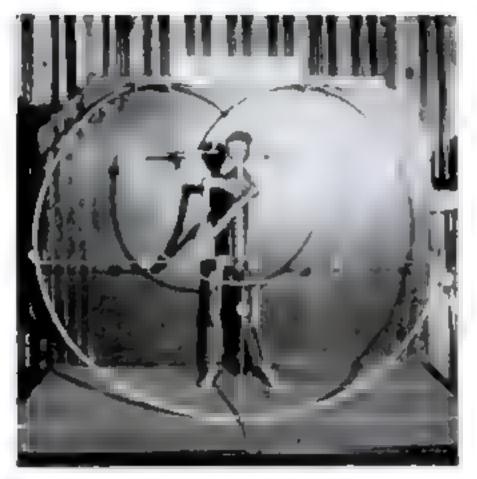
Stretched Steel Is Stronger

Born these metal sheets contain the same amount and quality of steel, but the latticed one is stronger, remaining rigid even while bearing the combined weight of a man, the solid sheet and a block, as shown above. Made by slitting and stretching solid steel in a press, it is said to gain increased strength from the vertical slant of the thin ribbons. Wheeling Corrugating Co., Wheeling, West Va., developed the sheet.



Water in Honey Measured

This new pocket-size refractometer helps the honey tester tell at a glance the amount of moisture in a sample without referring to conversion charts. The instrument, made by Bausch & Lomb Optical Co., Rochester, N. Y., measures how much light rays bend when passing through the honey. This varies directly with the water content of the sample.



Robot Golfer Never Misses

This golfer's form is perfect—it never varies an inch. He's Oscar, a mechanical robot designed by Clifford H. Landis of Chicago to demonstrate the perfect golf swing in slow motion. Hips, shoulders, arms and head turn in perfect time, driven through shafts from a motor in the base.

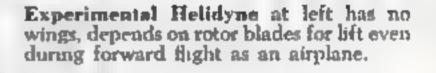


Jets Get Sleek Fuel Tanks

THE long, sleek object suspended from the plane wing above isn't a bomb. It's an ultramodern auxiliary fuel tank, designed to cut down wind resistance in the Air Force's high-speed jets to an absolute minimum. Made of aluminum, the three-section tank is held together by a tie rod that runs from the bullet nose to the tapered tail. Length of the tank's center section varies according to individual flight requirements.



Convertiplane



THE Helidyne is an early bird in its field. While three manufacturers are working on Air Force contracts to design a convertiplane, the Gyrodyne Company of America went ahead and put just such an aircraft in the air. It takes off straight up as a helicopter, switches in mid-air to forward flight as an airplane, then reconverts to a 'copter for a vertical landing.

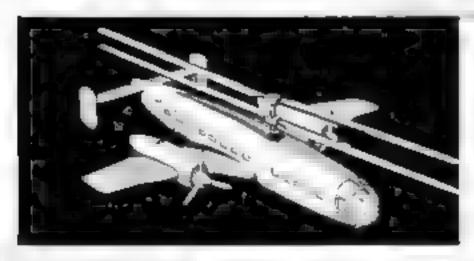
They did it by simply sticking an engine driving a conventional propeller on either side of a belicopter fuselage. Coaxial belicopter blades carry the Helidyne straight up to gain altitude and provide some forward speed. Then the propellers gradually take over forward thrust, giving the craft greater forward speeds than it could attain as a pure belicopter,

The Helidyne shown at the top of the page is admittedly experimental—but it has flown, and brings another old aviation dream closer to reality.



Model on drawing board has stub wings added. In fast forward flight they will take over full lift while rotor blades are locked.

Helicopter transport below hovers while winches raise a cargo pod into position from the ground. It may have a convertiplane version.



Convertiplane liner of future may carry over 50 passengers at speeds greater than 350 m.p.h.





How They Make

Shotgun

Exacting manufacture, step-by-step inspection and endless research pay off in take-it-for-granted performance.

By Kendali W. Goodwyn

CACKLING like an outraged spinster, a big pheasant flushed from the tall grass and started to take off like a Thunderjet for the wild blue yonder. The hunter's gun came up fast and smooth, leading the gaudy game bird just enough to let him fly into the shot column, and wham!

"Nice shooting, Ed," said the other man

as the ringneck went into the bag.

"Thanks, Jim," Ed grinned. "I'll give the gun a little credit—and," he added, slipping in a fresh shell, "this ammo is okay too."

The fact is, modern shotgun ammunition is so dam good we rarely stop to think about it. Hold a shot shell in your hand and it looks pretty simple. Brass head and paper body—primer on one end, the other heavy with shot. But that simple-appearing item contains 14 components which are made and assembled in an intricate manufacturing process requing 212 operations.

Let's visit the Bridgeport, Conn., plant of the 135-year-old Remington Arms Company —where they turn out 1,800,000 shotgun shells a day—and get an idea how it's done.

Shot Making Carefully Controlled

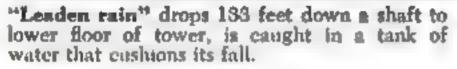
The shot tower is a good place to begin. Strangely enough, they still make shot much as they did in the days when George Washington loaded his fowling piece for a little wingshooting—by pouring molten lead through a sievelike gadget that looks like one of your wife's frying pans and dropping it down a shaft to give it time to cool and

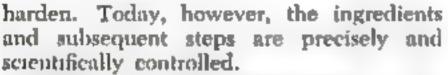


Atop the 167-foot shot tower, where lead pigs are melted at 700° F., molten metal pours

through holes in shot forming pan, emerging as round pellets already beginning to harden.







Tower supervisor Arthur Hiertz—a keeneyed Remington veteran who's been on the job here 41 years—explains that the proper proportions for chilled (hardened) shot are approximately 95 percent lead, four percent antimony and one percent arsenic. The antimony does the hardening and the arsenic gives the mixture the right surface tension.

The rough shot is screened for roundness, sorted for size, and polished by whirling it in drums containing graphite. Then it's stored in vats ready for use. They make around 532,000,000 shot here in one day.

Machines Are Almost Human

Meanwhile, in another building, the paper body, the brass head, the five parts of the primer, and the wads and powder are being prepared for assembly into the shell.

The base wad is punched into the body and the brass head fitted on. The primer the shell's "spark plug"—is assembled (a touchy business because of the highly explosive priming mixture) and inserted. Now



Perfectly round shot roll over these tilted glass plates fast enough to skip a gutter that traps lopsided ones for remaking

the partially completed shell goes to the loading machine—a complex tribute to man's mechanical genius—which in one series of operations measures and pours in the powder, adds the filler wads, weighs and feeds in the shot, crimps the open end of the body into a six-way star, irons it flat and seals the shell with a nylon-waterproofed paper disk.

Shells Get Rough Treatment

All through manufacture, the shells are under close scrutiny, both visual and mechanical. Heads are automatically measured by passing them under a height gauge; powder charge is checked by a plunger that probes into each shell and stops the machine if the load is off as much as five grains; samples of every lot of completed shells are cut open for loading inspection. And in Remington's ballistics division, shells are fired and tested under far stiffer conditions than they will ever encounter in the field.

That's why when you draw a bead on your favorite target, whether it's pheasant or partridge, canvasback or clay pigeon, you can count on your ammunition—sure as shooting!



Primer cup homa

non-corrosive prim-

ing mixture.

Shot pellets, unde as round as possible to insure straights trajectory.

2,3 Felt filler wards keep power belt ad about to delayer maximum blow.

4 Over-powder wad-a disk of cirdboard % such tiltek.

5 Progressive-burning power der builds up power als ng gotte barrel until ca arge has lett mazzic

6 State wad, a hightly wound strip of paper, strengthens head and primers

4 Thin, waterproofed paper seal climinates old "top wad" which often got in way of shot as it left gun, spoiling pattern, Seal also gives load and shot size information.

13 Paper body of shell, corrugated for smoother loading and extraction.

12 Brase shell bend, annualed to prevent brittlenom.

11 Battery cup holds primer together.

10 Anxil vets off printing mixture.

9 Paper disk is lid on top of priming mixture.

Priming mixture ignites shell.

Term "gauge" for size of shotgun shell goes back to time when the diameter of a one-pound ball of lead was one-gauge. Thus, diameter of

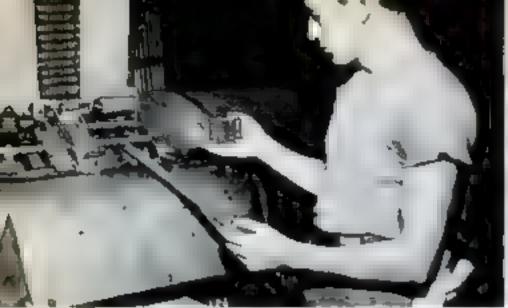
12-gauge shell (shown enlarged above) is same as that of one of balls formed by dividing pound of lead into 12 equal spheres.



Blanks for shell heads are punched out of a roll of brass and formed into cups. Next steps in processing are training, polishing training, and embossing.



Brass head comes out of embossing machine all tunished except for local triboring of fluide. Then it's ready to be litted onto shell body (Continued on next page)



Paper for shell bodies is cut, stamped with Remington imprint, rolled and pasted into long tubes. Razor-sharp disks in cutting machine slice tubes into five body lengths.



These are the tiny primer rups, which are pouched the processed much like the briss shall haids. They had the priming mixture which explodes on impact of firing pin.

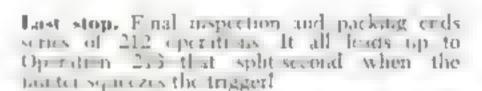


Two filler wads of felt go into each shell on top of careboard over-powder wad. The strings telt acts as a juston paising shot out of gun barrer when slick is fired.



It's done with mirrors. Inspectors extract holdes trads and primers used and ot as particles assembled shells pass along a convexor system.

In ballistics lab, shalls are fired in fixed runs" to the kixefoots and truch a Pattern is raid by counting in a first of pelets letting 30 rada area.









Twin flotation chambers are flooded so dock can move in under plane. Pneumatic bumpers

protect flying boat from damage at all points of contact. Hull rests on removable pallet.

Dock Walks Off with Seaplanes

A SEAPLANE dry dock that can subinerge itself, move backward, forward or sideways, and crawl up sandy beaches on tractor treads promises to simplify the tricky handling of giant flying boats.

Each of the two pontoon-like floats has a propeller-mounted at the opposite and from the other-that can turn through 360 degrees to give complete maneuveralishts. There are three tractor treads mounted in the cole fashion, and two control stations either of which can operate the Edo Corp. unit. These photos, made with scale models, show how the dock would beach a P5Y, Convair's fast new turboprop scaplane.

As belinsman approaches shore, he trued is power from propellers to enterp her treads. Our of two large phenomena constraints and he seem trased under wing to support it.



Floating dock has two propellers and three tractor trade to give barbar sea tractor or billity. At dangers is apposite ends of floation thealers are each pits for it has not.

V-shaped removable pallet and nah hall rests is transferred on its who led good to a my toading platform. In actual operations this would be done by in as of wines or tractor.

OCTOBER 1951 175



P.S.

Last minute news

ABOUT 2,500 NEW RADIO HAMS qualified for licenses in the first five weeks after the FCC lowered requirements for new amateur operators. Most of the applications came under the Amateur Novice Class that was set up to help beginners get on the air more quickly. Applicants need only pass a simplified examination and a five-word-a-minute code test. Novice licenses are good for one year and are not renewable.

GAMMA RAYS from a \$7,000-an-ounce metal--thulium, one of the rare-earth elements--are being used in England for X-ray-type pictures of aluminum castings. Irradiated in an atomic furnace, thulium gives off rays of just the right length. Most rays are too penetrating.

NEWEST GLOBAL BOMBER, eight-jet version of the B-36, is expected to make its first test flight late next month. This swept-wing YB-60 will be powered by eight Pratt and Whit-ney J-57s, each developing 10,000 pounds of thrust . . . BRITISH claim their latest jet fighter, the Hawker P-1067, is the fastest in the world, superior to both the F-86 and the MiG-15.

FIRST PLANE designed to act as a tanker aircraft, troop transport, cargo carrier or hospital plane has been delivered to the Air Force. Called the KC-97E, it's the newest modification of Boeing's Strato-freighter . . . NEW HYDRAULIC FLUID for the Navy can be spurted into the flame of an oxyacetylene torch without catching fire. Called H-2, it's made by R. M. Hollingshead Corp. Flammable fluids have caused several air accidents.

LOOK for one of the major automobile producers to announce a gas-turbine

bus in the next couple of years. It's in the works. Popular Science forecast just such a development a year ago last summer (PS, June '50, p. 98) . . . GENERAL MOTORS may follow Chrysler in using power steering on passenger cars. Detroit reports say it will be on some 1952 GM models. . . . TINTED WINDSHIELDS can be added to any car by applying a colored-plastic filter strip. It sticks to the glass by itself. Filterzone Auto-Vision Co., Brooklyn, makes it.

COAST-TO-COAST TV became a reality last month when the Bell System completed its transcontinental micro-wave network in time to put the Japanese peace-treaty negotiations on the first nation-wide television hook-up.

UHF TELEVISION is still a year or two off, but sets built to receive the new channels have arrived. All models in the new Motorola line will be available with built-in UHF tuners. Opening of the ultra-high frequencies to commercial telecasting is expected to add some 70 new channels to the present 12 VHF (very-high-frequency) bands, making possible more and better distributed TV services.

THE NAVY may be planning to atombomb a submarine. It has asked Congress to let it use a partly finished submarine as a target for "underwater explosions."

DIESEL FUEL made from oil shale at Rifle, Colo., (PS, Feb. '49 p. 130) has come through a use test with flying colors.

THREE SYNTHETIC pain killers may help the fight against drug addiction. Demerol, methadon and dromoran do morphine's work, but don't give the "kick" to addicts, and are easier to control, being factory-made . . NEWS on synthetic cortisone is breaking fast. Latest: Merck & Co., Inc. says it can make it from substances found in such abundant materials as yeast, Mexican yams, soy beans, cattle spines and wool fat. After process is perfected, it will mean more cortisone.

The Editors



Winterizing Your Home

home tightly for the cold menths should is easy,

and it costs little when you do it yourself,



INHERE TO INSULATE FOUR HOME

By Donis Sneigr

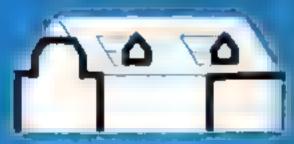
NOME winter when Grandpa was a boy, he'd A hand out the long Johns and woolen shirts. He needed them, for often the only warmth in the house was around the kitchen stove-and that just made the cold deafts from doors and windows more noticeable. Today we expect even the haby to wear nothing warmer than a disper while playing in front of the picture window, Your house, whether it's new or old, can be that cozy. All kinds of materials - most so easy to apply that your wife can belp-are now available to fill the cracks, stop deafts and keep the furnace heat in (and summer heat out). They cost little, and over the years pay back a big dividend both in comfort and actual fuel dollars saved.



HOUSE BUILT ON THE GROUND (UNUSED ATTIC)



HOUSE WITH CRAWL SPACE UNUSED ATTIC, UNHRATED GARAGE



Mules

HOUSE WITH BASEMENT, AND LIVING QUARTERS ON SECOND FLOOR (UMNEATED GARAGE)

Yurn the page to see how you can winterpreef your home

CALKING Keeps Heat in and the Dampness Out

Tools like these make the job easy for you



Interchangeable-nozzie gun has tips of different sizes and shapes for different jobs. The gun can be completely disassembled, which makes cleaning it easy



Less expensive type has cap that is secured to the barrel by a twist lock instead of by threads. It comes with only one nozzie that is part of cap.



Cartridge gun is probably the casiest of all to load. Barrel, nozzle and cartridge are one disposable unit. When the barrel is empty, you throw it away.



Calking compound also comes in tubes like toothpaste. The applicator nozzle is a part of the tube. To use the tube, you turn key to squeeze out compound.

178 POPULAR SCIENCE

ALMOST every homeowner faithfully puts up storm windows and doors when the leaves begin to fall. That's smart business—keeps heat in the house and cuts the fuel bill. But many homeowners forget to calk around those same window and door frames, forgetting that they can lose lots of heat through gaps between the wall and the trun.

Calking compound is an elastic material of a putty-like consistency. It is used to fill seams, cracks and joints in wood, masonry, metal, glass or any combination of those materials.

You can buy it in several colors, the most common being white, gray and black. The white and gray are oil-base compounds, and you should use them where you want to paint over them. The black kind has an asphaltum base. Don't paint over it, because the asphaltum will often bleed

Here are the ways to use your



Black, asphaltum-hase calking compound is best for clanney and roof flashings. Use the same kind of calking around year pipes on roof.

Leaks often develop where shingles overlung the edge of the roof. Run a bead of black asphaltum-base compound all along such edges.





Tips of nozzles are beveled. Use this angle of the bevel as your guide (left) and hold gun so bevel is parallel to the line of the joint. Best kind of calking bead is a little convex (right) on the surface. Convex bead allows for shrinkage and prevents early cracking.



through the paint. The oil-base compound won't bleed through.

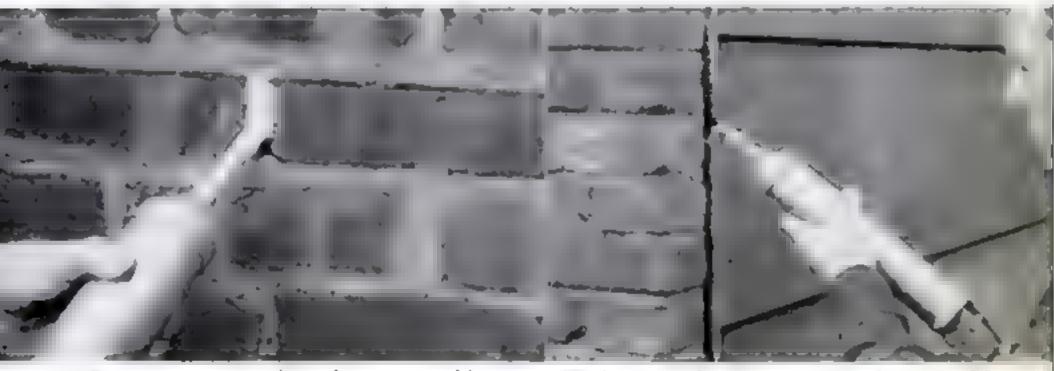
Calking compounds usually are sold in two grades—gun grade and knife grade. The gun grade is most common and is especially made for application with a calking gun. The knife grade is stiffer and is designed for application with a putty knife or small trowel. It is used for many jobs where the softer gun grade would not be suitable. It makes an excellent glazing compound—more elastic and more permanent than putty. And if you use it rather than putty to fill cracks or nail holes in siding or trim,

it will not crack out as the wood expands and contracts. Since it dries harder than the gun grade it is ideal for filling seams in exposed wooden floors—such as porch floors.

Calking guns vary considerably but work on the same principle. A plunger on the end of a rod rides in the barrel. A ratchet on one side of the rod is engaged by a pawl on the trigger. Pulling the trigger forces the rod and plunger into the barrel, squeezing compound out of the nozzle.

Regardless of the type of gun you use, the basic techniques are the same. Pick a warm, dry day. Don't calk when the tem-

gun at six important places that often need calking



Scrape out moriar that is loose or crambbing in masonry joints. Dust joint with a brush and pump in a load of calking compound

calked, water may seep in belond the walls.

Calking around door frames should be carried down to the stoop. Then run calking along the joint where the stoop meets the house. Joints where wooden columns muct masonry floors or walls should be calked to keep out water that eventually will not the wood

Cracks often develop at points where two dif-





Calking needs replacing when it looks like this. Scrape out all calking that is cracked, crumbing or loose. Old chisel is good tool.



Loading bulk compound. Remove cap and nozzle. Push plunger all the way into barrel. Put end of barrel in compound (left). Pull back on plunger (right) letting gun down into can as compound is sucked into barrel. Wipe off excess compound from outside of barrel.



To clean gun, run out all remaining compound and wash gun with solvent. An old paintbrush will help you wash plunger and threads,

perature is lower than 55° F. or when the surface is the least bit damp. When the temperature is too low, the compound becomes too stiff to work properly. It won't dry and hold as it should.

When painting your house you can calk at the same time. You don't have to wait for calking compound to dry before painting over it. If you are doing a two-coat job, apply the first coat of paint. Let it dry, calk, and then go ahead with the finish coat. It's best not to calk over raw wood. Prime it first.

How to calk. If you find loading bulk compound is a messy job, use a calking cartridge. This is a cellophane tube with compound inside. You drop it in the barrel and snip the end off with seissors.

You'll notice that nozzles of the guns are beveled. Hold the gun so the angle of the bevel is parallel with the joint to be calked.

Pump the trigger once or twice until compound starts to coze out of the nozzle. Move the gun slowly and steadily along the joint, squeezing the trigger as you go. As the ratchet cheks, release the trigger and start the slow, steady pressure on the trigger again. Keep the nozzle moving along evenly all the while.

Where to calk. Check around window and door frames and other openings. Scrape out all calking that is cracked, crumbling or loose. Remove calking that has shrunk so it is pulling away from the wall or frame. If you can slide a knife blade between calking and wall or frame, then the compound has started to pull away. After scraping out old calking, dust out the joint with an old paintbrush.

If old calking is sticking firmly at the sides but has started to crack down the center, then it is generally safe to re-calk over the old compound.

Windows and doors. Calk completely around window frames. Also fill any joints in the frames that may have opened. If you have steel casement windows, calk all around them too. Then go inside and seal the joint where the steel frame and the plaster meet. Use the smaller in round nozzle or the pinched nozzle for the inside job.

Around door frames, carry the calking down to the spot where the frame meets the stoop. Also calk wherever a stoop, porch floor or sidewalk meets the house.

Exterior walls. If these walls are wood siding, fill all cracks and seams, using the

smaller round tip. If the walls are brick, fieldstone, stuceo or other masonry, use the 1/2" round tip. Scrape out loose or cracked mortar and replace it with calking compound. Water that seeps into masonry joints may freeze and crack the masonry.

Roofing and flashings. Reload your gun with black, asphaltum-base compound for calking the roof. The black compound is best for roof jobs because it stands up better under exposure to the sun than the

white or gray compound.

Check around all chimney flashings, calking where necessary between the metal and the brick work and between the metal and the roof. Other spots on the roof that may need calking are around vent pipes and along the flashings in valleys. Also run a bead along the eaves where the shingles overhang.

Wherever you have to fill wide joints such as on a flat roof covered with roofing felt—use a putty knife or trowel to apply the black compound.

Cleaning the gun. Run any remaining



Plastic-base compound is made for filling cracks around bathtub, shower, sink, or joints in tile. No gun is needed. Just squeeze the tube.

compound out of the gun. Then disassemble the gun and wash all parts in mineral spirits. Use a piece of wire to clean the tips. Make sure the threads on the barrel and cap are clean. An old paintbrush is handy for washing the threads and the end of the plunger. When the parts are clean, assemble them and wrap the gun in a cloth.

While ordinary compound and a calking gun can be used to seal joints in tile and cracks around a bathtub, there is a plasticbase waterproof compound for this purpose now on the market. It comes in a tube and you apply it by squeezing the tube. It dries

in four to six hours.

INSULATING Your Home for More Comfort

M OST houses built in recent years have been at least partly insulated. A lot of older ones haven't been insulated at all. The chances are that, unless you live in a new, lavishly built house, additional insulation will improve your home.

What to expect. Good insulation is like money in the savings bank; it pays a regular interest in unconsumed fuel. How much it pays is tough to figure in advance, depending as it does on a lot of variables. You should be realistic in estimating the probable savings. Don't total up five different advertising claims and expect the fuel bill to dwindle to the vanishing point, like the character who bought so many gassaving gadgets he expected to bail out the tank of his car every ten miles.

However, here's what a full insulating job can do: A six-months' test was recently run in Belleville, N. J., on two identical two-story homes. One was fully insulated and the other only above the upper ceiling. Over the period of the test, it took \$40 more gallons of fuel oil to heat the incompletely insulated one than it did the other.

At 12 cents a gallon, that's a six-months' saving of \$40.80.

Blowing it in. If the walls of your house weren't insulated when the house was built, and if you want to fill them, probably your best bet is to call in a professional. His crew will arrive with a truck, big blower, long hoses and bags of insulation. They will remove sections of siding, cut holes in the sheathing, blow in the insulation, and seal up the wall. If you have a lot of time and energy you might do the job yourself, but it is laborious and tricky. One problem is locating the fire stops, the short, transverse two-by-fours between studs. To do it right, you should cut a hole just under each fire stop, and this calls for a lot of sounding and probing

Unless you are very ambitious, better not tackle a blowing-in job for an entire house. It isn't too hard, though, to do a limited area, say, a bathroom with one cold outside wall that makes the room a bit chilly for comfort. Insulation can be fed into wall holes with scoops bent up out of dustpans.

Don't forget that if you can couple the

You can install any of these kinds of insulation

Blanket: This is a fibrous material sandwiched between paper. Rolls are different lengths and widths. Among materials used are mineral wool, wood fibers and cotton.

Loose fills Available as pellets of expanded mica (vermiculite) or as loose libers. The latter may be slag wool, rock wool, glass wool or shredded redwood bark. You just pour it in place

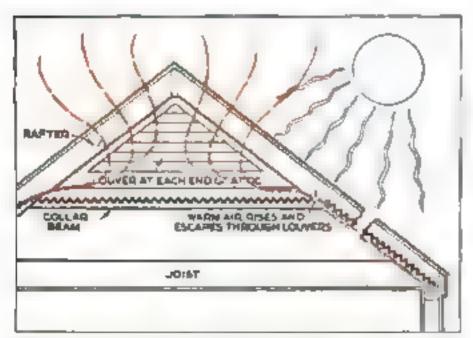
Insulating board: These rigid boards—some of them decorative—are made of vegetable or wood fibers. They often are used as finish walls and ceilings. The decorative ones are called tile and plank boards. Some are nailed in place. Others are put up with clips or special adhesive. Reflective: This is a bright metal foil,

Reflective: This is a bright metal foil, usually aluminum. It comes in long lengths and is just wide enough to be stapled between studs, joists or rafters.

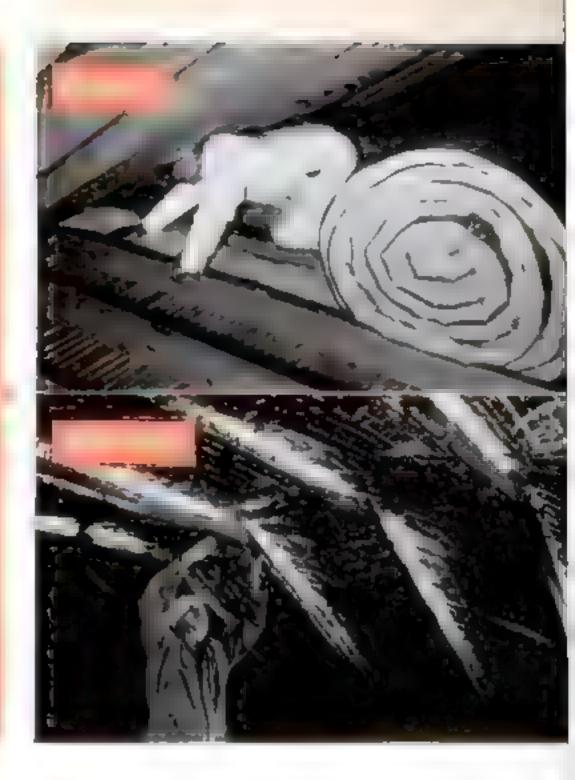
Batta: Similar to the blanket type, but in the form of pads that are just long enough to be bandled easily and wide enough to fit between studs, rafters and joists. In some, the insulation is glaid to a sheet of treated paper that acts as a vapor barrier. Others are enclosed between two sheets of paper, one of which is a vapor barrier. They can be stapled in place.

wall-insulating job with remodeling work, you can get inside the wall more conveniently. For instance, if an outside plastered wall is to be covered over with paneling or wallboard, it will be easier to forget the outside, siding-and-sheathing approach and just cut into the plaster at the ceiling and at the fire stops.

Insulating the attic. Here the job is



Roof insulation keeps your home warmer in the winter and cooler in the summer. It keeps heat from escaping during the cold months. In summer, heated air flows away through louvers.



much simpler, and unless you're very lazy, there's no need to call in a pro. About the only tools you need are your hands, and the only cost is that of the insulation itself.

Where the attic is not floored but has just walkways on the joists, it's simply a matter of lugging the insulation upstairs and putting it between the joists. Bags of loose fill are bulky, and you may have some trouble getting them up narrow stairs or through a small hatchway. If there's a fair-sized attic window, it's often easier to rig up a pulley from the roof overhang and haul the stuff up.

A plastered ceiling between the joists must be treated gently, of course, since it won't take much of a load. It's a good plan to cleat together a platform of boards to stand on so that you can slide it along the joists as you work.

Work with an old hat on because it is often a dusty job and you are also apt to konk yourself on the rafters. And if you put in loose mmeral wool, work with gloves—the material may irritate your hands.

If the attic flooring is nailed down, you aren't necessarily prevented from putting



insulation between the joists. Often the boards are really subflooring, put in carelessly and not thoroughly nailed to the joists. If that's the case, it isn't much of a job to pry up six or eight boards, put in the insulation, replace the boards, and move on.

Installing your insulation. If you use batts or blankets in your attic, lay them between joists and staple them between stude and rafters. Loose fill, of course, is poured.

Reflective insulation should always be installed with an air space—at least %"—on each side of it. As soon as reflective insulation is placed where its face touches another surface, it loses efficiency. The metal foil then conducts heat.

Foil insulation can be stapled on the edges of framing members, but it's better to staple it between them. Then if you later decide to finish your attic, you can nail up wallboard and the board won't touch the foil.

When installing any insulation, remember to follow the maker's directions closely. His insulation is made to be installed in certain ways. Follow his instructions and

you'll get the best results from your work.

Ventilation. This is a must, especially for summer comfort. Keep the air moving out from under the roof as it heats up and the heat won't have a chance to transfer to the rooms below.

When you're insulating between the rafters, start at one side where the rafters meet the joists. Don't carry the insulation all the way to the roof peak. Run it across between the collar or tie beams and down the other side to the joists.

For ventilation, install louvers at each end of the attic. Place them as high up as you can get them., They must be above the collar beams and the insulation.

While you're about it, see to your storm sash and weather stripping. Neglecting these two safeguards is like locking the barn after the horse is gone. A lot of the heat saved by insulation and calking can be lost through loose-fitting windows and doors.

ENID

Bargains from house wreckers: You can save real dough on doors, windows, bath fixtures and many other things by buying them secondhand. See PS next month.



Iron Fire Screen Built in One Evening

You can turn out this practical fireplace accessory with just a handful of tools, even if you've never hammered a rivet.

You don't have to be the village blacksmith, complete with anvil and forge, to build this metal fire screen. I did it with ordinary tools and less than \$3 worth of material in about three hours.

After I hacksawed the four frame members to length to suit my fireplace, I squared them and clamped them together. Then I soft-soldered each corner. The %"-mesh

hardware cloth was stretched over the back of the frame and spot-soldered.

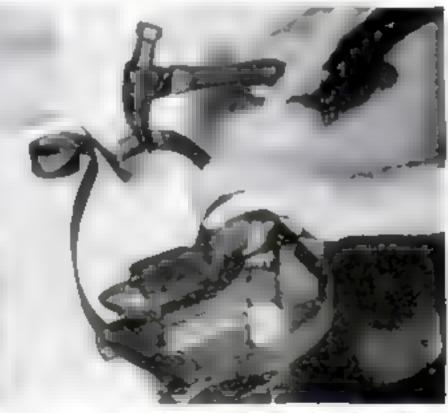
The use of soft solder on a fire screen may sound risky. But it has worked okay for me because the fireplace heat isn't intense enough to melt the solder and because the screen conducts the heat away fast.

However, if you prefer, you can use rivets to fasten the frame corners and hold the cloth to the screen.

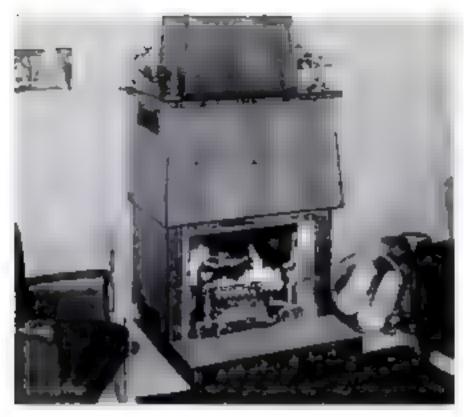
To finish the screen, I painted it black and then antiqued it with gray-green glaze. —John Rogers, Dallas.



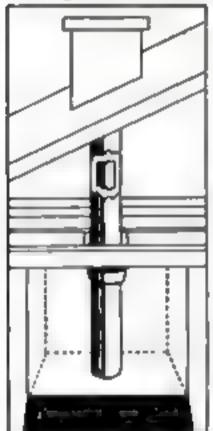
Screening was stretched evenly across the back of the frame, clamped and spot-soldered at intervals. An alcohol torch proved handy for this.



Feet were bent from %" flat steel without heating. A vise and a claw hammer did this job. Feet should be riveted or bolted to the frame.



Fireplace Needs No Masonry



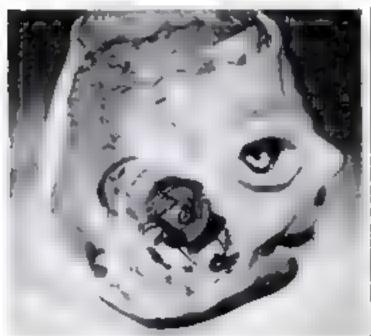
HERE'S a real woodburning fireplace, complete with hearth and chimney, that can be hought "off the shelf," carned in and installed without tearing up the house for costly masonry work.

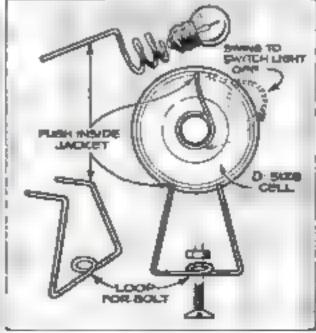
The Hearthplace and prefab chimney can be set up in a day's time, according to the maker, LaSalle Products Inc., Elkhart, Ind. The chimney housing on the roof is galvanized sheet steel.

Fireplaces for flat-wall or comer use are obtainable in genuine mahogany, walnut, birch and knotty pine.

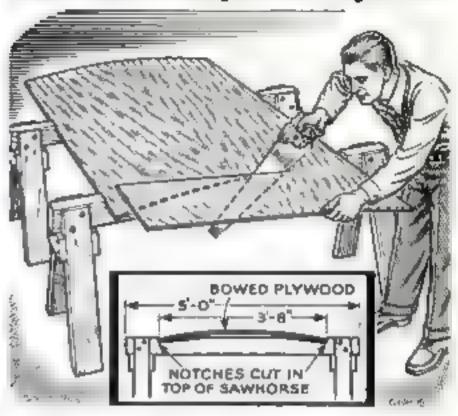
Lighted Jack-o-Lantern is Safe

A LIGHTED pumpkin safe for the youngest kids can be made with a flashlight cell and bulb, two paper clips, a bolt and a nut. The





Saw Horse Helps Cut Plywood



Because craftsmen often buy plywood in less than full-sheet sizes, one lumberyard uses special saw horses to hold the sheets for cutting. Each horse is about 5' long, with a notch cut in the top about 3'8" long. The plywood is bowed to fit into the notched section, which holds it tightly, cutting down vibration. The sawing can then be done without difficulty.—G. E. Hendrickson, Argyle, Wis

Enamel Covers Dark Finish

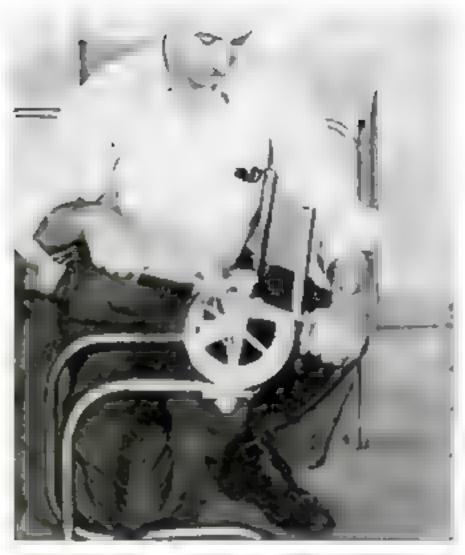
With a new enamel trio you can apply a blonde or limed-oak finish right over a darkwood finish without even sanding. It's good on natural woods, too, where the grain is unattractive. A ground color is applied first, followed by a graining liquid and a clear finish. N-B Enamel Paint Co., Union City, N. J., makes it.

dry cell will last for a whole evening of fun.

Straighten both clips. Bend one around the bulb base, leaving a straight leg that can be pushed into the cardboard jacket of the

cell, with the bulb on the center contact. Swing it aside to turn the light off, as shown by the dotted lines.

Shape the other chp into a foot. Push both ends into the cell jacket. Punch a hole in the bottom of the jack-o-lantern and bolt the foot down through the bent loop at the bottom.—H. Walton.



Pipe Bender Shapes Furniture

Modern kitchen, porch and lawn furniture can be made by the home craftsman with the aid of the tube bender pictured above.

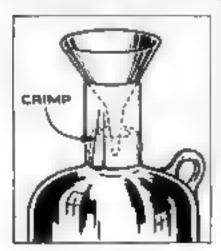
The tool, originally designed for plumbing and electrical work, makes smooth bends in 1" steel, iron, brass or aluminum tubing. It is made by Holselaw Bros., Evansville, Ind.

Nail Set Removes Wallboard

It's sometimes necessary to remove a section of wallboard when remodeling or repairing. Prving it loose may damage it. A better method is to drive the fastening nails all the way through the board with a nail set When replacing the board, fill the holes with plaster -A. Yaw, Seeley, Calif.

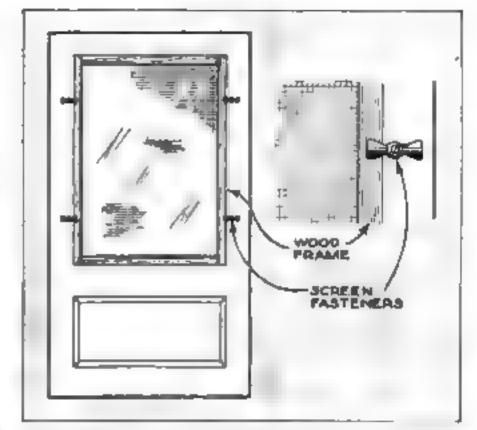
Tin Can Helps Fill Jugs

IF you have to fill a number of jugs, you can save time with this setup. Cut the bottom from a tin can and set it over the jug opening to receive the funnel. It will ruse the funnel, allowing air to escape as the



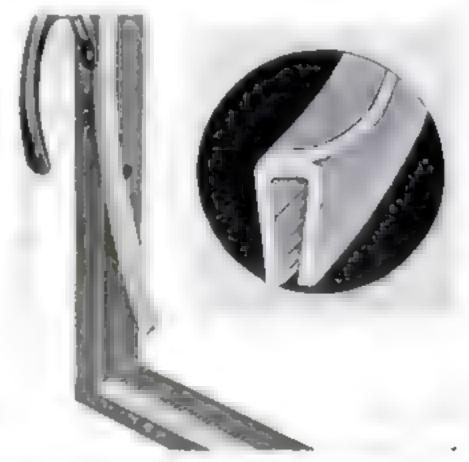
liquid is poured and insuring a rapid, even flow. If the can rests too snugly on the jug, put a crimp in the edge with phers to allow the air to escape more quickly.—

G. E. Hendrickson, Argyle, Wis



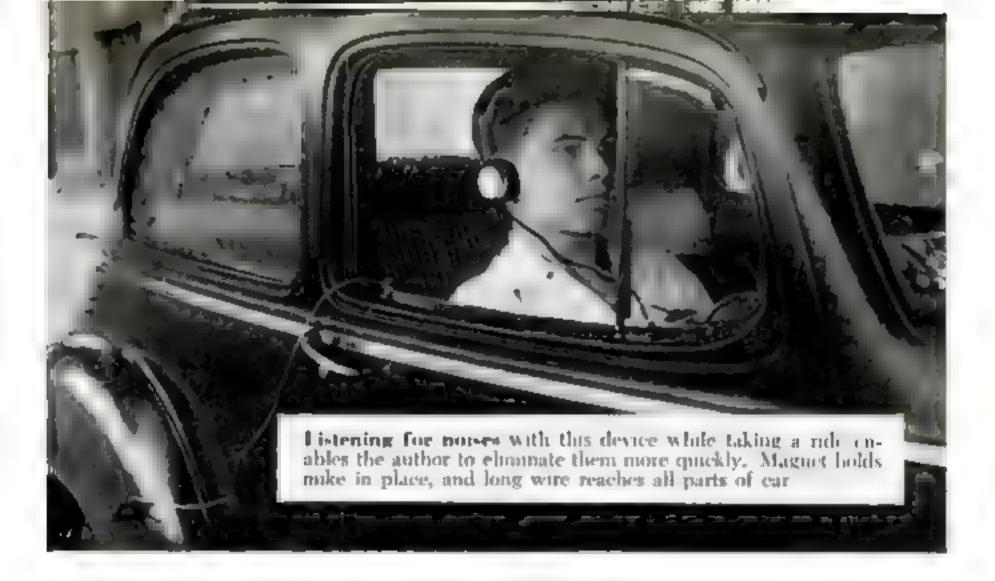
Plastic Glazes Storm Doors

The wire- or cord-reinforced plastic sheeting used in place of glass on poultry-house windows can help to make your house airtight this winter. A framed panel of the material, attached to a screen door as shown, will convert it to a storm door. Drafts that leak in around cellar windows can be blocked out by tacking the sheeting to the inside of each window.



Plastic Strip Seals Casement

FLEXIBLE vinyl channeling for sealing a metal casement window against drafts, water and dust is sold in 38" lengths and can be cut to fit with ordinary scissors. Tiny ridges molded inside the strip grip the metal casing. The added lip at the top (shown in inset) presses firmly against the window frame to make a tight seal. Draftite Products Co., Dayton, Ohio, makes it.



I Locate Rattles with a Stethoscope

My cigar-box outfit is better than a doctor's for the Job. A mike picks up sound, transformer makes it louder.

By David Findlay



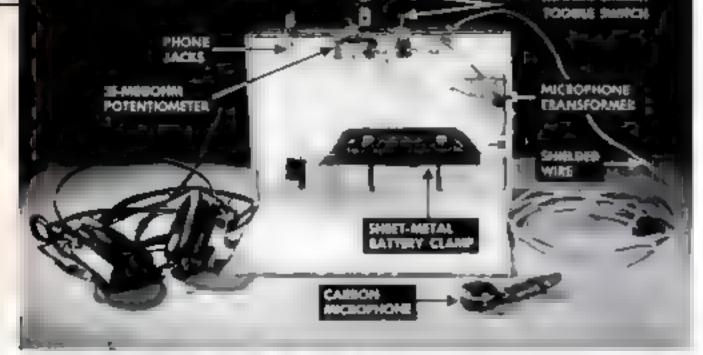
Engine knocks can be found too. Moving mike around on cylinder head picks out a slapping piston. Connecting rod knocks are loudest if mike is shifted to bottom of motor block.

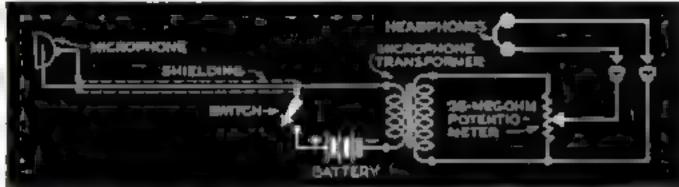
EVERYBODY loves a quiet car. But any mechanic will tell you squeaks and rattles are barder to find than a mosquito in your bedroom.

My homemade electric stethoscope makes



Other uses. The 'scope will spot trouble in such household items as record changers, fans, vacuum cleaners. Hidden water pipes can be traced by turning on water, following sound.





Stethoscope parts are housed in a cigar box. Power comes from three 1%-volt flashlight cells clamped between two sheet-brass contacts. As in a radio, the potentiometer provides volume control, a help in such spots as a worn transmission where sound level is high, A "pot" of the value shown was found to give best results. Stethoscope will work well, however, without a volume control. Connect transformer output wires directly to phone jacks.

finding the cause of noises a lot easier. It can be assembled for peanuts from a few parts available in radio or electrical stores. A surplus throat microphone, bought for less than 50 cents, picks up the noise, but any carbon mike could be used. A doorbell transformer works well if you can't get a mike transformer like the one I used.

The assembled unit works like a doctor's stethoscope, but a 15' wire enables you to listen from any seat in the car, a big help when you're tracking down a rattle or squeak that appears only when the car is in motion.

Front-end, steering and spring noises can be found by driving the car over a bumpy road with the microphone attached

Here are tips to help you silence car noises after you've found them.

Why Drive a Rattletrap?

By Clinton R. Hull

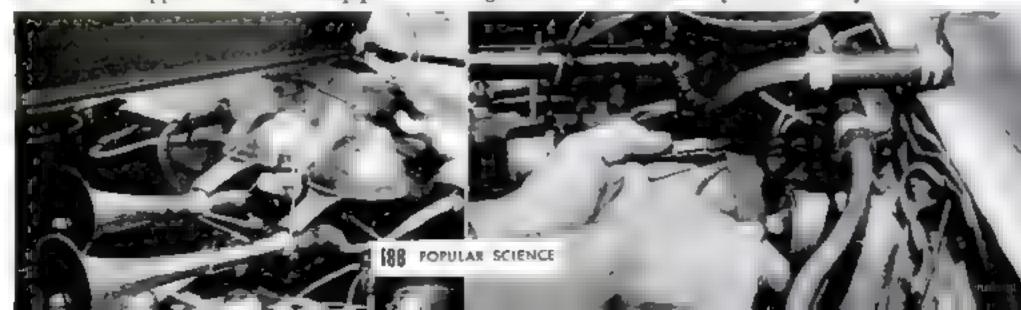
located them. Put a screwdriver in one pocket, a roll of tape in another, grab a grease stick in one hand and an oilean in another—and you're ready for the villains. You can lick mue out of 10 noises with

OST squeaks and rattles in your ear

You can lick nine out of 10 noises with just this simple equipment. The photos and drawings on this and the next two pages give some suggestions on how to proceed—but remember that your own ingenuity counts too.

Twist-tension a wire bridle to stop rattle of horns mounted on firewall. Tape and lacquer bridle to improve appearance. Bridle can also be used to support muffler or tailpipe.

Tape cables and wires together in sets of two or more under hood and behind instrument panel to cut down cricket-like chirps. Tape, grease or wax at friction points also helps.





Microphone originally had two pickup heads. Since only one is needed, they were separated by cutting through rubber connecting strip. In center of this you'll find a wire and a steel strip. The shield of the transformer lead was soldered

to the strip, the wire to wire (above, left). Alnico magnet is taped to mike head (above, right) for remote listening while car is in motion. Sounds are transmitted through magnet to the mike. Magnet isn't needed in close-up work.

to different parts of these assemblies. A loose bumper part will be almost inaudible when the microphone is attached to the hood or fender, but will sound off clearly when attached to the bumper.

When the microphone is placed on the side of a transmission or rear end, broken or chipped gear teeth will show up. The

rattling sound that indicates worn bearings can be heard—you can even tell which bearing is at fault by placing the microphone over the position of each.

Moving the microphone over the motor will show the position of a knock, and the condition of the water pump, generator or distributor can also be determined.



Lack of lubricant may cause wheel creaks and door noises. Apply stick wax to door striker



plate and contact surfaces of wheel and drum. Use light oil on door hinges, latch mechanisms.

Sponge-rubber ball cut in half and inserted as shown will help deaden hood vibration. Rubber weather strip (arrow) can be applied where hood hits cowl if new hood lacing is needed.

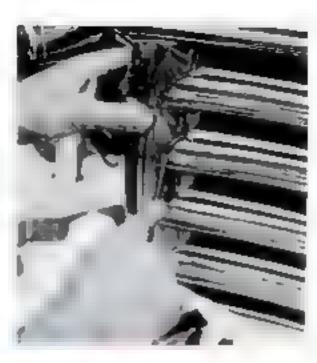
Rubber striker buttons, shimmed up or replaced, may help eliminate door noises. To compensate for latch wear, loosen striker-plate screws and reset plate. [Continued on next page.]

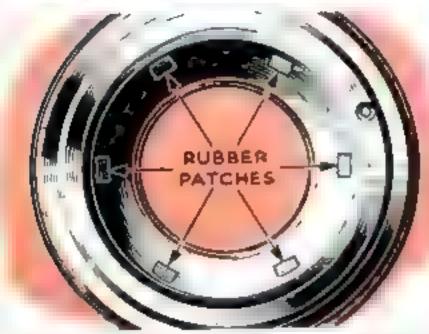




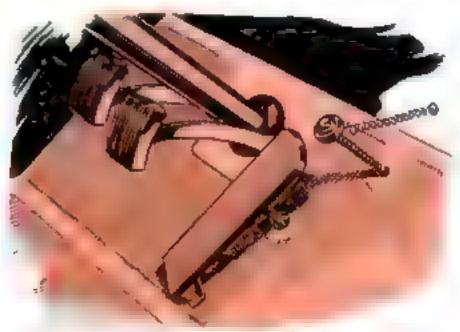
Trunk-lid mechanism is guilty of many squeaks and rattles. Oil, grease or wax stops squeaks in counterbalanced springs, spring rods, folding deck supports or latch. Tightening boits or hinge rivets and increasing spring-clip tension on lid arms checks most rattles. If gasket has shrunk, loosen hinge bolts (left) and adjust lid to sent properly.

Bits of rubber or tape jammed into cracks (right) highten up loose sections of the grille.





Large wheel disks can be kept from squeaking by comenting several rubber patches on inside surface where disks rub against the wheel.



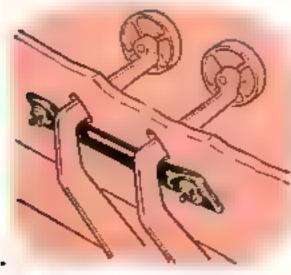
Vibration rattle in a floor starter pedal can be eliminated by stretching a weak spring from the upper part of pedal shaft to the firewall.



Bending license plate slightly and mounting it in straight frame will usually keep it quiet.

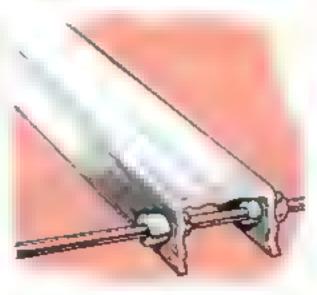


Wrap took in several folds of cloth. Cement felt padding to inside of glove compartment.

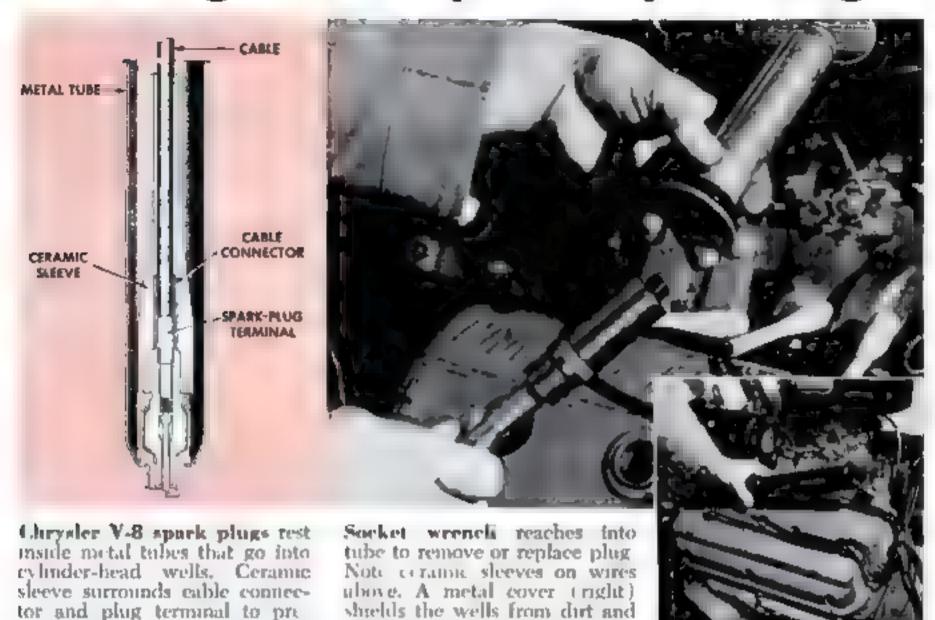


Rubber hose screwed in place as at left will keep pedal bars from slapping the underside of floor boards when you left your foot. Be sure to maintain free clutch travel or it'll shp.

A cork, drilled, split and slipped over a fuel line or cable where it passes through metal part of car is a good replacement for a rubber grommet that has wora out or deteriorated.



Servicing New Deep-Well Spark Plugs



moisture. Screws hold it in place.

Chaysler's new V-8 engine introduces a spark-plug installation that requires new servicing techniques. The plugs are at the bottom of deep wells in the cylinder heads.

Wires are removed from the plug terminals by grasping the ceramic sleeves and pulling straight up. The sleeves must be handled gently to prevent chipping. To un-

Ironing Pad Handy in a Car

vent flashover to metal tube

Next time the ironing-board pad in your home is replaced, rescue the old one. It does a fine job as a noise-stopping wrap for car tools. And when you have to crawl underneath, it will keep your clothes clean.



screw the plug, a 13/16" thin-wall deep-socket wrench is inserted into the well. A metal cylinder comes out with the plug.

When plugs are replaced, a torque wrench should be used to turn them up to 30 or 32 foot pounds. This is an important step since standard compressible gaskets are not used.

Gun Shoots Patch into Tubes

PATCHING a puncture without removing the tube from the tire sounds like wizardry, but that's what a new rubber-shooting repair gun does, according to the maker, Notz-Sweney Co., Englewood, Colo.

Once the nail has been pulled out, the tip of the gun is placed on the hole and the handle turned. This is said to seal puncture holes in both tube and tire.



Winter Driving Aids You Can Make



Mat for Traction, Out crebber uk door 1 st in half, atom the party path troops and you l be able to get and a section when yet at stock



Ballast. It your car weeks bill st in Fick to THE TAX DESCRIPTION AND AS A SECOND SECOND ceased not it it is at one but the second to put in or take cut than saidles, i court in



Chain Lighteners Cet have bords tras will river by the mked tose storens to se delat above near to condition arous had Stetel tops or s where unlike killing the bab



nameded souver is best when your have to dig your car out. A shovel adapted as shown above Will by the terms



Windshield Scraper. Buy an 8" window squeegee at a hardware star a same a 24" TTI C The mar land and let you re one seas without to Bridge Line



Undercoating Your Own Car

It's a thrifty job in two ways. You save the cost of having it done, and keep the body metal from rusting away.

By E. F. Lindsley

UNDERCOATING is an extra that an auto dealer often tries to load on when you buy a new car. But you need not dig into your pocket for this extra. You can do

the job yourself at a total cost of around \$6, and save from \$25 to \$40.

Endercoating has two advantages. First and foremost, it will protect a car by preventing the rust that eats through fend ers and body. Secondly, sprayed or brushed into metal-to-metal cracks and crevices, the black asphalt material will forestall many a squeak and rattle.

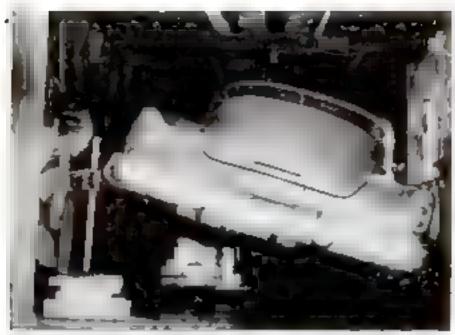
Most people think of undercoating in connection with a strictly new car, but it's actually a job that pays dividends on one of any age. In fact, it offers a means of curbing rust that may already have gained considerable headway on a car six or 10 years old.

Remove rust. Whether the car is new or old, all rust must be removed and the metal cleaned off before the undercoating



Here's what you need—several cans of undercoater, a wide paintbrush to apply it, a jack, blocks, and brushes and trisodium phosphate to clean off all dirt and grease under the car. Trisodium phosphate is mixed with hot water

OCTOBER 1951 193



Block up car rather than depend on jack. Lift car short distance, place blocks, get another bite with jack. Block car at two points—one forward under engine, second near rear. Canting car sideways lets you reach most points.



Tighten body and chassis bolts as a preliminary step. This is good insurance against rattles and squeaks later. Use torque wrench, if available, checking with service station for the bodybolt torque specified for your car

goes on. Rust left under the coating would go right ahead with its damaging work. So work on the metal until it shines.

Where do you get the material? Retail stores of the big mail order houses generally stock undercoating in gallon cans. This sells for around \$1.40 a gallon. For the average car, four or five gallons will do the job.

in the shops, undercoating is usually sprayed on. For a single car, you can do it with a brush. The material goes on easily.

Cleaning comes first. I tackled my car after dirt, grime, oil, grease and road tar had been accumulating on the under surfaces for nearly two years. Getting this off is the most difficult part of the procedure.

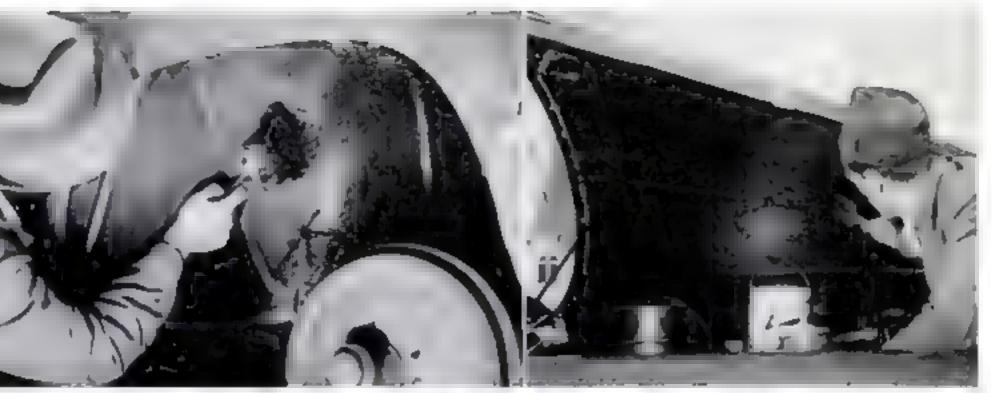
Steam cleaning is probably the best way to prepare the car. If you can have this done reasonably, it'll save sweat. Instead, I relied on a wire brush (with an attached scraper), a fiber brush and trisodium phosphate to loosen up the grease. Trisodium phosphate is an inexpensive crystalline salt sold in hardware and paint stores for use as a water softener and cleaning agent. Mix it with hot water and daub it on oil and grease areas with a cloth or sponge.

In doing this job it's as important to know what not to coat as what to coat. Keep the material off moving parts of the clutch and shift mechanism, the grease fittings, oil pan, transmission, muffler and tailpipe, brake lines and connections, driveshaft, and rearaxle housing. Apply it liberally, however, under the fenders, on the frame and under



Clean off all dirt. Fiber brush makes short work of loose mud and sand (left). Clay and clinging soil need repeated soakings and hosings. Were brush removes light rust. Scraper attached to it sweeps off clinging grease and oil (right), after latter areas have been soaked

with a strong solution of trisodoum phosphate. Steel wool, were brush or a solvent will remove black chassis paint used on gas tanks and other parts of some cars. Ordinary black frame enamel does not require removal. Allow metal to dry well after oleaning.



Brush on undercoater in an even, fairly thick coat. A thickness ranging from 1/16" to X" will be fine. If material needs thinning, gasoline or naphtha usually can be used. Apply it under fenders, on frame, floor, gas tank, inside rear

bumper, on front and rear gravel deflectors and special fender panels. Hood is a good place to finish off job. Car can be driven within a couple of hours after coating, but overnight drying is better.

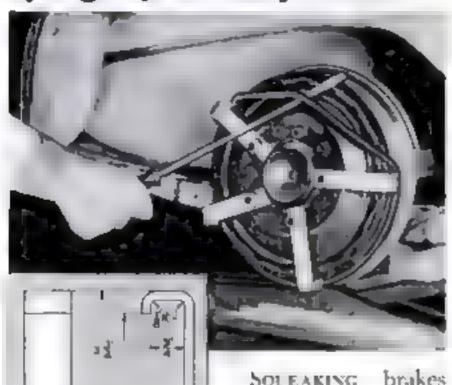
the floor. Under the fenders work it right out to the edge.

Play safe. To get under the fenders, you'll have to remove the wheels. Unless the support is very stable, remove only one

wheel at a time. Take no chances with poor jacks or blocks.

Some undercoaters are inflammable while wet. So work with good ventilation—and avoid smoking and open flames.

Springs Quiet Noisy Brakes



34

I HITM

BOIA

SQUEAKING brakes can often be corrected by stretching heavy coil springs around the drams. Pontiac is now distributing spring sets to its dealers for this purpose. To install the

springs, four temporary retainers must be made as shown in the drawing and mounted under the wheel-stud nuts. These retainers are removed after the spring has been secured with small clips that come with the set.

Calking Fills Fender Line

To LESSEN the chances of rust in the joint where the rear fenders meet the body in my late-model car, I filled the gap with calking compound (knife grade), smoothing it off even. I then let it dry for a week and applied touch-up



enamel to the compound. The result looks like a welded seam.—Frank Radden, Brooklyn.

Disk Cuts Headlight Glare

CENTERED on a headlamp by three legs that clamp under the retaining ring, this



new car accessory is claimed to break up glare from the center filament. with minimum light loss. It consists of a prismatic lens mounted in a chrome band. It's made by Abcone Die Casting Co., Detroit.

Gus and the

When stolen bank money begins to show up at the Model Garage, Gus turns

detective—without a single clue but a temperamental lumber truck.

By Martin Bunn

HIYA, Gus."
Gus Wilson looked up from a car radiator he was working on to see the tall, trim figure of a state trooper standing in the Model Garage shop doorway.

"Sergeant Jerry Corcoran," said Gus. "You haven't been by in months. Where the devil

you been keeping yourself?"

"Making the rounds as usual," replied the trooper. "Only now I have to cover more miles and more cases—I'm driving a radio car these days instead of a motorcycle."

"Well, glad you finally found some free

time to stop by for a chat."

"Sorry, Gus, but this is a strictly official

call," Jerry said, grimly.

Gus cocked his head quizzically as he held a match to his pipe. "Can't remember that I've jumped any red lights or knocked down any old ladies recently.

Jerry Corcoran laughed. "No, Gus, it's got nothing to do with you personally, but I think you and some of the other merchants in town can help me if you will."

"Sure thing. What's up?"

Stolen Money Traced to Garage

"Remember that big bank robbery down

in the city early this summer?"

Gus nodded. He remembered it only too well. At the time, the papers had been full of the story, telling how three men had forced their way into the City National Bank one night, cracked open the safe and made off with close to \$80,000.

"Well," explained Jerry, "the Feds think that job was masterminded by the same guy who's pulled at least four other big haulsall of them safe-cracking jobs. And what's more, the Feds have a hunch he's hiding out

around here."

"How come?" asked Gus.

"Some of the money has been turning up in the daily deposits here at the bank-they know the senal numbers of most of the stolen bills. As a matter of fact, Gus, several have turned up in money you've deposited in the last few weeks."

"In my deposits?"

"Don't worry, Gus," Jerry grinned, "but it does mean that the guy we're looking for may be one of your customers. Been working on any strange cars lately?"

No Clues to Go On

"Now look, Jerry," said Gus, "you know as well as I do that all kinds of cars pull into a roadside garage. People stop for gas, they want their oil changed, they have a flat they want fixed. Sure, most of our business comes from the townspeople, and we know them. But every day we service dozens of cars we've never seen before."

"Yeah, I know," replied Jerry, "and the heck of it is that according to the flimsy descriptions we've got of this guy he looks just about like everybody else-no distinguishing features-just a Joe Doaks. All we're reasonably sure of is that he's about 40 years old and has dark hair. We also know that he does a pretty good disappearing act between heists."

"Not much to go on," said Gus.

"You're telling me?" Jerry groaned. "And he's all mine-to find, that is. The captain put me in charge of the case this morning. Said it would mean a citation, or maybe even a promotion, if I can come through."

Gus and Stan Check Bills

For the next few weeks, Gus and Stan Hicks, Gus's helper, paid close attention to all strangers who stopped at the Model Garage. They were leary of all bills and checked them against the list of serial numbers Jerry Corcoran had left with them. Luckely, the numbers fell into sets of continuous sequences so checking was largely a matter of memory.

More than once Stan or Gus thought they had a suspect—judging from a driver's looks -but each time the number on the bill failed to check and the suspect turned out to be no one more dangerous than a road-weary salesGus peered under the open kood while Frank maneuvered the big straddle around the mill yard, picking up lumber. Again there wasn't a hint of a miss.





man, a casual tourist, or a visitor in town on

legitimate business.

But Gus and Stan continued to be suspicious of every driver of a strange car. Gus was in the garage office late one afternoon making change for Stan when he heard a car drive into the adjacent repair shop. Looking out through the open office door, he saw a blue pickup truck ease to a stop beside the repair bench.

"Never saw this truck before," Gus

thought as he walked toward it.

Just then, the door popped open and a dark-haired man wearing a bright plaid lumber jacket stepped out.

New Truck Is Just a False Alarm

"Don Thatch," Gus called when he realized that the driver was the owner of the local sawmill and our biggest lumber-yard. "That truck had me guessing for a moment. Didn't recognize it."

"It's new; bought it about six weeks ago," said Thatch. "Had to do something. That

old one was falling apart."

"Satisfied with this one?" asked Gus.

"Pretty much," Thatch replied. "Right now, it's about ready for the final checkup and I'm hoping you'll be willing to give it a going over. It'll save me a long trip into the agency in the city."

"Do what we can," said Gus. "Any par-

ticular complaints?"

"Well, she's uneven as the devil when she's idling, but I know you'll take care of that. When can I have it?"

"Well, I'm near ready to close now. How

about around noon tomorrow?"

"Swell, I'll have one of my men pick it up. Oh, by the way, could you stop out at the mill someday soon? One of the straddle trucks we use for hauling lumber is giving us trouble. The driver claims it's got a bad miss but the new handyman-mechanic claims there's nothing wrong."

Gus thought for a moment. "Tell you what, if we're not too jammed up here to-morrow afternoon when your man comes I'll ride back out with him."

Gus Meets en Odd Character

When Don Thatch's man showed up shortly after noon the next day, the pickup truck was ready and waiting.

"You riding back with me?" the man

grunted.

"That's right. Understand Don's been having some trouble with one of his straddlers."

"Wouldn't know," the man grumbled as he raced the truck's engine impatiently.

The ride to the mill was made mostly in one-sided silence. Gus tried to make conversation, but when he found that all he could get out of the man were grunts, he gave up.

Don Thatch was just coming out of the door when the pickup pulled up in front of the mill office. "Glad you could make it, Gus," he said. "That straddle truck I told you about is parked over in front of the repair shop. Let's go around."

Driver Bears Watching

"Odd sort of character you've got driving your pickup," said Gus as he followed Thatch around the corner of the office building. "Does he ever say anything?"

"Don't know much about him," said Thatch. "Hasn't been on the payroll very long. Keeps pretty much to himself. Good

worker, though, so I can't kick."

As they walked along, Gus made a mental note to let Jerry Corcoran know about the

pickup driver.

The repair shack was a squat two-story affair and parked beside it was the big orange beetlelike truck with its engine and driver's seat perched high up on the four stiltlike legs that rolled on wheels.

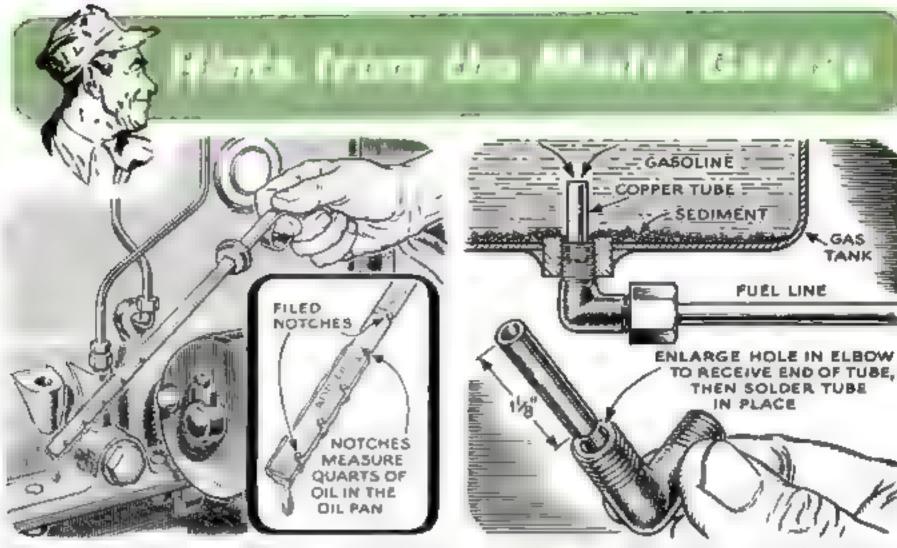
Don stuck his head inside the door of the building. "Ned," he called, "will you come

out here for a minute?

"Meet Gus Wilson, Ned," Thatch said as a wiry, fair-haired man joined them. Then he added, "Well, I'll be getting along and see if I can locate the driver."

"Glad to meet you, Mr. Wilson," the fellow grinned as he rubbed his hands on the leather welder's apron he was wearing. "Mr.

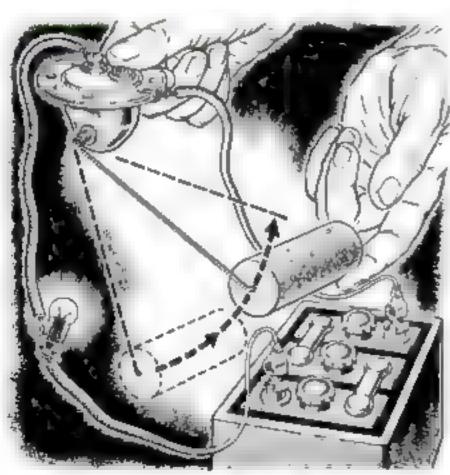
[Continued on page 254]



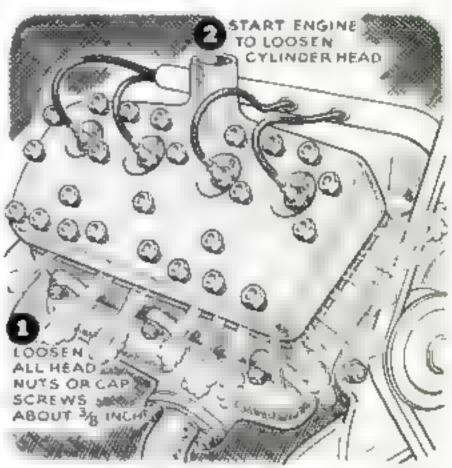
File Marks Measure Oil. Next time you change oil, add the new oil a quart at a time and file a mark on the dipstick for each successive level. Your stick will then give an accurate check in quarts.

Commission of the second second

Keeping Gasoline Clean. Trucks, tractors and older cars sometimes have the outlet at the bottom of the tank. A piece of copper tubing installed as shown above will help keep dirt from the line.



Testing Fuel-Gauge Tank Unit. You can check the rheostat in the tank unit of a fuel gauge by connecting it in series with a small six-volt bulb and then working the float arm. With the float in empty position, the light should barely glow. As you raise it, the light should steadily increase in brilliance.



Blowing a Head Loose. Because V-type engines will run on one bank, there's a simple method to loosen stuck heads. Back off the bolts on one head about X", leave the spark wires connected, start motor, and head will blow loose. Then tighten this side down, back off the bolts on the other side and run the motor again.

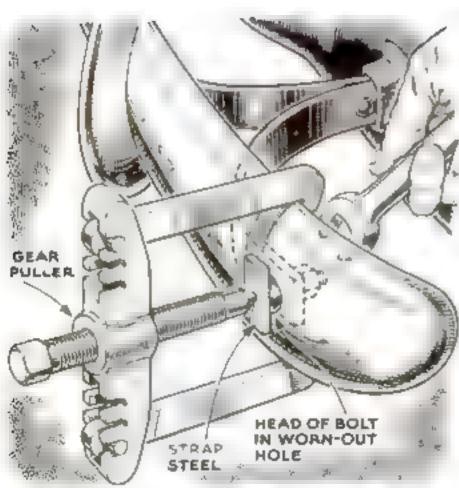
MORE Hints from the Model Garage



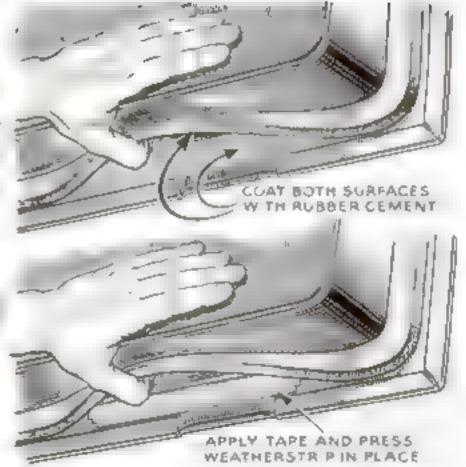
Hose on Nozzie Avoids Scratches. If you use a garden hose with nozzie to wash a car, the nozzle may slip from your hand and mar the paint. As a safeguard, slip a piece of radiator hose snugly over the nozzle. Turn this to adjust the spray.



Special Wrench for Head Nuts. A long T-wrench made as shown here can save lots of time in removing head nuts or cap screws on V-8 engines. Use one hand as a bearing for the shank and spin the handle rapidly with the other hand.



Tightening Bumper Boits. If a square locking hole in a bumper has become so worn it won't hold the bolthead, assemble a two-jaw gear puller and a steel pad as shown here. (The pad keeps the puller shaft from chewing into the bolthead.) Turn the puller screw down tight and you'll be able to loosen or tighten the bolt as desired.



Replacing Weather Strip. When rust on the edges of a car door loosens the weather strip, try this. Coat both the strip and metal with rubber cement after brushing off the rust. Between the strip and metal, sandwich several layers of double-faced cloth adhesive tape (such as Bauer & Black Polyken No. 105). The strip will then hold.

How to Judge Used Power Tools

You have to look under the paint to spot quality. Here's the first of two articles on how to get a good buy when horse-trading for machines.

By Darrell Huff

LOOKING for a secondhand drill press, saw or lathe is like shopping for a used car. Just peering under the hood isn't enough. There are certain rather specific things you need to know in order to tell a sound bargain from a shiny lemon.

There are a few general points, too. The first is the name of the maker. Is he known for good tools? Is he still in business? There's nothing more annoying than owning an

orphaned tool with a broken-down hearing that can't be duplicated.

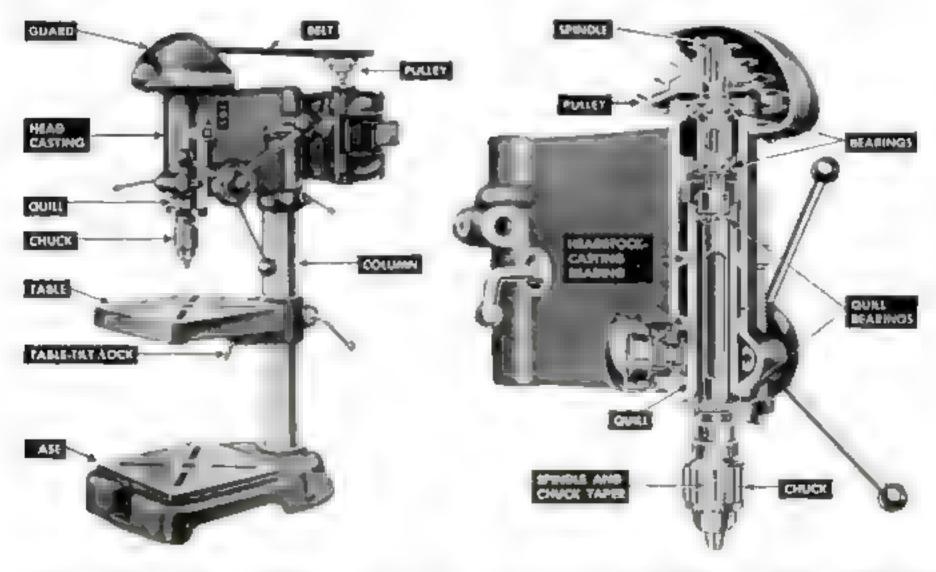
Note whether the tool is of the manufacturer's first-quality line or something designed for light home use. The latter may do you very well, but you want to know what you're getting when you begin to talk pince.

Don't overlook accessories. The seller of used equipment is likely to have accumulated a good many of these at considerable cost. A used drill press offered at the original retail price may be a bargain if such items as a full set of drills and a mortising attachment are thrown in. An 8" dado head and some blades may cost as much as a medium-priced table saw.

Drill press: Watch for cracked castings and worn bearing housings

First question is suitability. Is it rugged enough for the work you have in mind? Is it big enough—in distance from center of chuck to column? (This is how the size of a drill

press is measured. A small, home model such as the 11%" will drill a hole in the center of any circle up to 11%" diameter.) Is the spindle travel long enough to suit your pur-



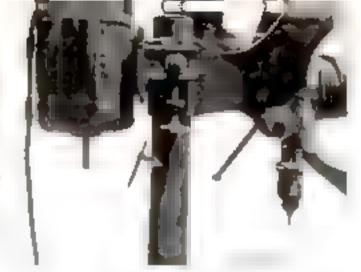
Major check points on a drill press are shown at left. If you could get inside the head cast-

ing, you'd see parts shown at right. Most wear occurs here, especially in the bearings.



Run quill down (left) and try to move it back and forth by hand. Watch out for too much lateral play at this point.

Test the chuck for wobble by putting a new drill in it and turning it by pulling on the belt (right).



poses? When you have answered these questions, you are ready to do some checking on the machine itself.

 Is there lateral play between the quill and the headstock easting? Run the quill down and try to move it back and forth with your hand. If there is noticeable play, better just walk away with your wallet still in your pocket.

If the drill press has a tapered spindle,

is the taper undamaged?

3. If there is a chuck, is it still accurate? Put a new drill into the chuck, and turn the spindle by hand. If the chuck is good, the drill won't wobble, If it does wobble, you may have to buy a new chuck. Typical price: \$7.60.

4. Are the pulleys worn or cracked? If there are shiny spots on the bottom of the pulley Vs, add a couple of dollars for replacement to the price asked for the drill

press.

5. Any cracked castings? These generally have to be replaced, and they are pretty

expensive items.

6. How does it run? This, of course, is the crucial test, and if you have to buy without making it you are taking a big gamble. The

best you can do in that case is to turn the spindle by hand. It should turn freely, without the gritty feeling or sound that indicates bad bearings.

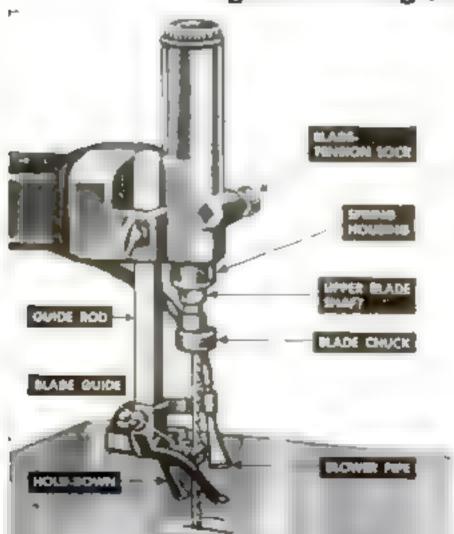
If the machine is set up to run, turn it on and listen. Excessive noise suggests that the bearing housings are worn, in which case the machine is of little value.

Put it through its paces as far as possible—drilling holes, of course, and using what accessories are at hand. In listening for noise, don't be perturbed by pulley whine at high speeds. That's normal. Rattles and roars, symptoms of worn or damaged parts, are what to listen for.

7. To check if table top is square with spindle, bend a piece of wire and put it in the chuck so that it almost touches the table several inches from the center. Botate the spindle by hand to be sure that the wire will just graze the table at all points in the circle

If the table proves out of square, there are two possibilities: it may have to be reground at considerable cost; or the surfaces at the table swivel may be out of line so little that it can be satisfactorily corrected by a little filing

ligsaw: Is it big enough for your works



SUITABILITY here is a matter of size, quality, condition—and especially how you expect to use it. If you don't have a bandsaw and don't expect to get one, you may need a pretty heavy jigsaw, one that will do some work that properly calls for a bandsaw.

I Try to move both upper and lower operating shafts from side to side. If there is play, try to find out whether the shafts travel in bushings or directly in castings. This is important because worn bushings are fairly easy to replace while worn castings are likely to cost you more than the machine is actually worth.

Check the driveshaft in the same way.Lateral play indicates worn bearings or castings.

202 POPULAR SCIENCE



Key test of a secondhand jigsaw: If you find lateral play when you try to wiggle the upper blade shaft, better add the price of new bushings or easings to the cost of the machine.

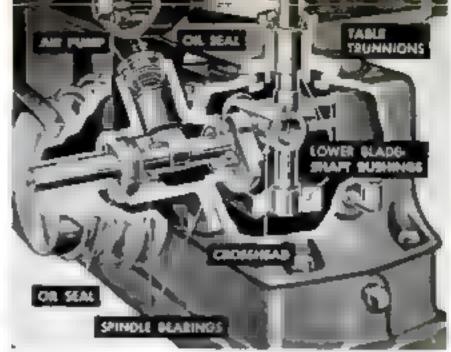
 If you can, start the machine and listen. Noisy running indicates presence of worn parts.

4. Wear in the driving mechanism can be detected by holding the lower chuck with one hand and rocking the drive pulley with the other. Any wobble of the chuck shafts when extended indicates bearing wear.

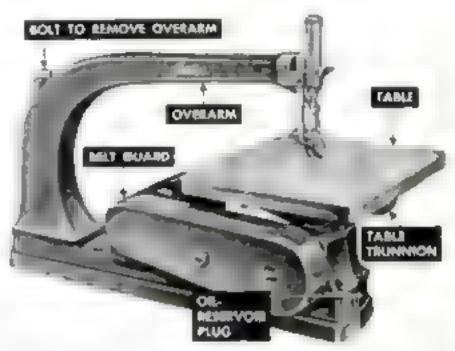
Examine chucks to see if all parts are there and undamaged.

6. Inspect blade guides for wear. These can probably be replaced at moderate cost if the maker is still in business.

7. Check vertical alignment of the blade. Unless the overarm is adjustable, anything wrong here may indicate a damaged frame.



Hidden mechanism is equally important, Tests and checks explained in the text will help you determine the condition of rotating and reciprocating parts shown here.



Principal parts of typical Jigsaw are shown as you see them from outside. Check carefully,

Wood lathe: Are any accessories included?

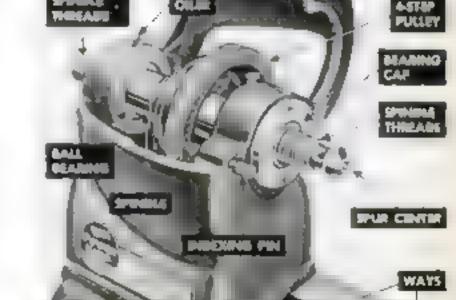
Main lathe points are shown at right, but save closest inspection for inside headstock, shown in photo below. Check spindle for lateral play and make sure spindle threads are good

BEGIN by asking yourself whether the lathe was built to do the kind of work you

need it for. If it has an 8" swing and you need a 12", it is hardly a bargain for you at

Same goes for distance between centers. The 24" size may do nicely—but not if you want to turn table legs. And if you contemplate making some kinds of floor lamps, even 30" between centers may not be enough. In that case, find out whether a bed extension can be bought. (Continued on next page)

TOOL REST



OCTOBER 1951 203

 Inspect the internal tapers in the headstock spindle and tailstock sleeve. If they are only slightly nicked they may be corrected, if they are badly banged up, they may call

for \$10 worth of replacement.

2. You can easily check the abgnment of spindle and tailstock center by sliding up the tailstock until the centers almost touch. If they are out of line, see if adjustments will line them up. Also make sure that the sleeve in the tailstock can be clamped in this position firmly and without wobble.

Look closely at the threads on both ends of the spindle. If these are worn or damaged, add replacement cost to the asking price of the lathe. Current price for a

new head spindle for a 12" wood lathe is around \$10.

4. Check the spindle for lateral play by trying to move it back and forth. If bearings or bearing housings are badly worn, you won't be able to do good work.

5. If you think you may want to use attachments for turning metals or plastics, make sure that the lathe bed hasn't been

nicked or gouged.

6. Are any accessories included? Various chucks and arbors are worth having and may cost up to \$10 or so. Wood-turning chisels usually cost close to \$2 apiece, carbide-tipped ones run just about twice that much.

Bandsaw: Be sure it uses standard blades

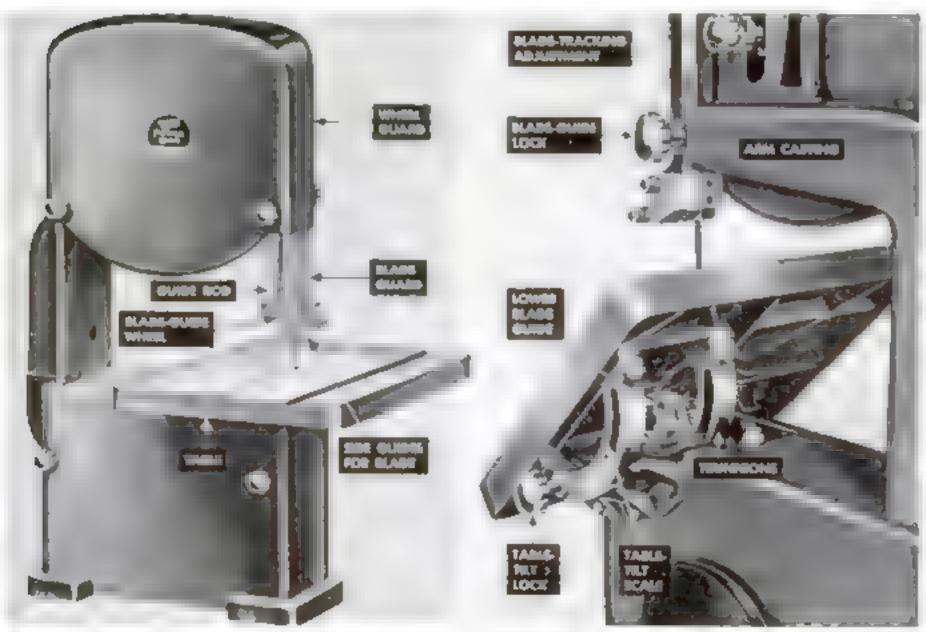
Size is measured in depth of throat, 12" from blade to throat being typical. If you want to work thick stock or do resawing, you'll want to know the cut capacity-4", 6" or, on the bigger floor models, 12" or even more.

1. Try to wiggle the upper and lower wheels. If you can do this, the bearings are worn and it may become impossible to keep the blade on.

2. For insight into the condition of the

machine in general, by all means check the rubber tires on the wheels. Wear suggests that the saw has had extremely hard usage or that one wheel does not track with the other-indicating a defective or damaged frame. (Replacing worn tires doesn't amount to much in itself-they cost about 75 cents apiece.)

Blade guides are generally replaceable for a few dollars. But if block guides are badly worn or the ball-bearing guides won't



Make a general check of the parts shown at left above. Tilt the table and use a flashlight if

necessary to inspect condition of table trunnions and lower blade guide, as shown at the right.

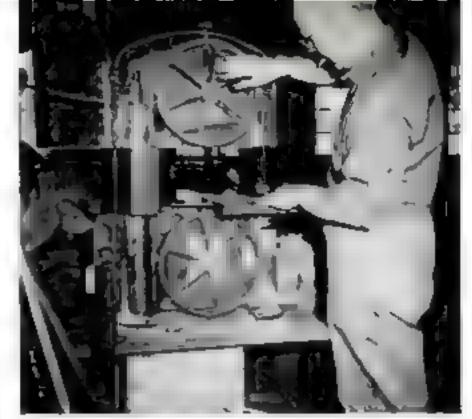
turn, be mighty sure that you'll be able to get replacements for them before you shell out.

4. There's another point where it is all too easy to get your fingers burned. Even if the machine is in fine condition and reasonably priced, it may not be an economical buy if it uses a non-standard blade. Having to have special blades made up all the time is inconvenient and adds substantially to op-

erating cost.

5. Are the wheels in balance? To check this, take off the wheel guards and blade and spin each wheel several times. If the same part of the wheel ends up at the bottom on several spins, the wheel is probably out of balance. This may make the machine vibrate so much that it would spoil the accuracy of your work—to say nothing of taking most of the pleasure out of it.

6. If you can turn on the saw, let it run a bit, listening for uneven sounds. Watch to



Open the bandsaw and take a look at the wheels and their tires. Try to wiggle the wheels. If you can do so, bearings are worn and it may be difficult to keep the blade on them.

see if the blade can be adjusted to run near the center of both wheels, and that it doesn't hit the guards anywhere.

Multiple tool: Is it easy to change from one tool to another?

If you are eagle-eyeing a secondhand Shopsmith, or one of the new flexible-use radial saws, or any other multi-purpose tool, you'll want to make many of the checks already mentioned, plus a few special ones.

 Even if it is not set up to run, you can put it through its changes to see how easily it converts from one tool to another. Watch for damage to bars or rods that might prevent an easy shift.

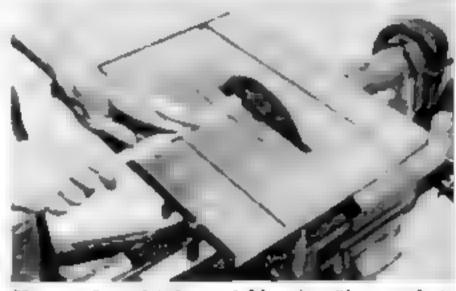
2. Look for external signs of neglect-

cracks, mars and rust.

3 Most important is the condition of bearings and power-transmitting assemblies. About the only sure way to check these is to run the machine under power. Your ear will tell you more about the condition of the machine in 30 seconds than your eye could in an hour.

4. Put a saw blade or sanding disk on the spindle to find out if it runs true. You can check this by holding a piece of wood against the disk or blade as it revolves. If it does not maintain even contact, the blade or disk is out of alignment—or the spindle is. Switch to another blade or disk. If the misalignment still shows up, you can figure that the trouble is in the spindle—a fairly costly replacement on most tools, to be figured as part of the cost if you buy.

5. Check suitability of the combination tool much as you would with single-purpose tools. Is the depth of cut adequate for your sawing operations? As a drill press, is there



Heart of multiple tool like this Shopsmith is the spindle. Hold a stick against saw or sinding disk as it runs. Stick won't maintain contact all around if spindle doesn't run true.

enough distance from column to chuck? Is the spindle travel as long as you'll need for your purposes?

Any power tool should be thought of as a long-time investment that will bring pleasure and often considerable profit to its owner. It will, that is, if it is a well made tool in good running order.

Hard-headed checking of your prospective purchase against these standards is one way to be pretty sure you are getting your money's worth. An inaccurate, balky or worn-out tool is no bargain, no matter what price you pay for it.

Next month: How to judge a used circular saw, jointer, sander, shaper and electric motor.

Shutters Make the Difference

Painted a harmonizing color, they add that finished touch to any house. Here are four useful styles.

EVER notice how many new homes have a bare, unfinished look? Lots of them are that way because they lack one thing-shutters. Good blinds are easy to build with hand tools.

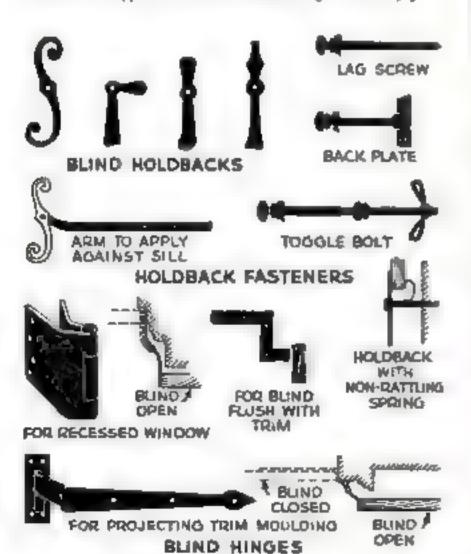
1. Shutter lines should follow the lines of the house. These blinds, of tongue-and-groove braced with one-by-twos, follow the horizontal lines of the house.

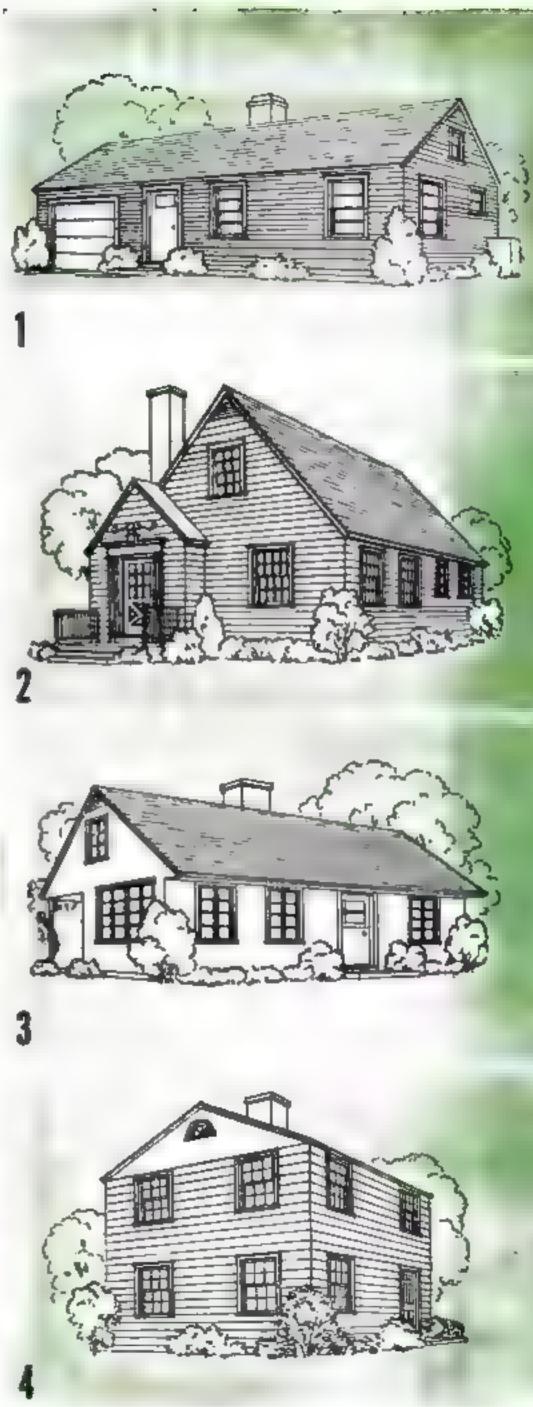
 When there are no dominant lines, shutters made with angled boards look well. These are braced with 1" strap iron.

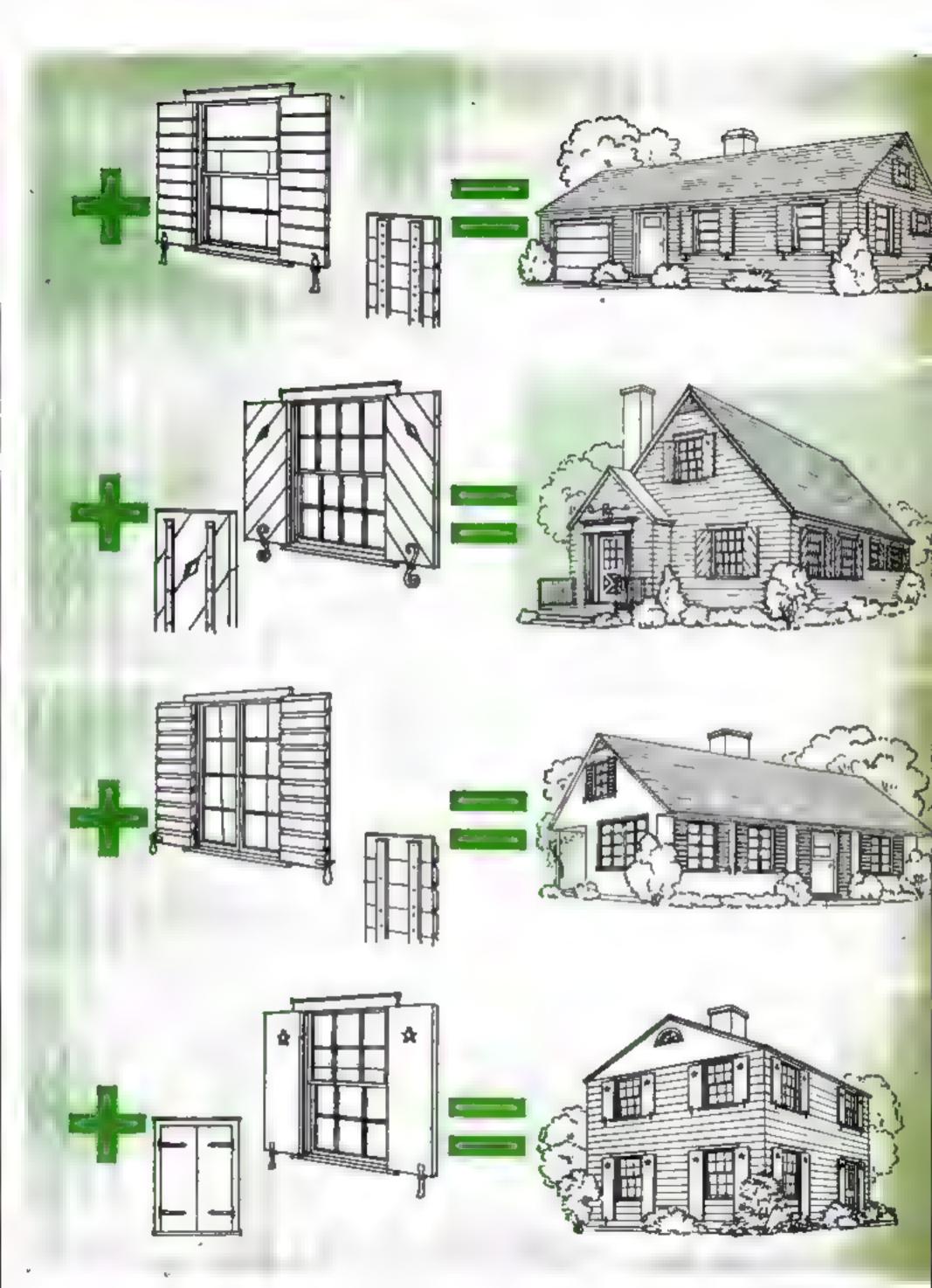
3. Shutters made of drop siding match the horizontal lines of the sash bars.

 These are X" exterior-grade plywood with X"-plywood stars as decorations.

Below are some types of shutter hold-backs and hunges that are available — Carl T. Sigman and William J. Ward, Jr.









Experts



Three things good movers do lassware is idtile. Glassware is idlast, ly wrapped and last on a barrel (left, lassue, goes into carton Onpaint s measured for a shipping crati

How to Pack Fragile Items,



Cover a table with a blanket or quilt (left) Have shredded paper or excelsior and a pile of newspapers on hand. Spread 2" layer of shredding on paper (center) and pit the first bowl or dish on it. Nest others with 2" of shredding

between, letting it spill over the sides of each to protect the edges. Pack at most four bowls, or six plates or saucers, to a least a Pick up two sheets of paper and fold to the one corner over the other (right). No string is needed.



To pack china lamp, distribute shredding events on doubled sheet twice as long as object Bed the lamp in this pulling the stuff com pletely around it. Roll lengthwise into a tight bundle, tucking the ends of the sheet m. No string is needed. You can pack up to four lamps to a barrel. Fall the spaces between with wrapped cups and saucers to prevent shifting



208 POPULAR SCIENCE

Show You How to Move

Here's how to handle everything from stemware to gas stoves

without knocking yourself out. You can use these professional techniques even if you're just moving down the street, or switching furniture around.

WHEN it's your move, it's nice to call in some husky professionals with a van and go fishing until the chore is over.

But if your new home is just a few doors down the street, or you have some spare time and no grand pianos to worry about, you may be able to do your own moving. A station wagon or a rented truck, plus a day's work for you and a helper, should see



Pack barrel in layers, with 2" of shredding on the bottom and between layers. Put in heavy china first, then light pieces, with glassware near the top. Wrap each glass piece separately in shredding and newspaper. Always stand glassware on end. Pack excelsion or shredding between bundles. Wrap jars of preserves individually in paper, shredding, and again in paper. Pack upright in a barrel, but fill barrel only half with preserve lars. Pack the rest with light items.

Wrap small mirrors and pictures in pairs (below). Lay first one diagonally in center of pad or blanket, face up. Fold pad over and place second mirror over folded part, face down. Then fold the two side corners, tucking them under the top mirror. Fold fourth corner to complete the wrap. Load high in truck, flat if you have a smooth, firm support, or on edge.



the job done, with a saving in your pocket.

It'll take sweat, but you can save yourself blood and tears if you know how. This assumes, of course, that you're as husky as the average and in fair physical trim. Otherwise, you certainly shouldn't tackle it.

However, moving takes more than muscle. It calls for teamwork in handling two-man loads, know-how in packing fragile items and skill in loading the truck. Here's the low-down from 500 experts—the drivers and handlers of Bekins Van and Storage Co., an organization with 51 branches in 10 west-ern states.

Skip the piano. Bekins men say you'll be smart to leave pianos to the professionals. Not even four husky amateurs can get a standard upright down a flight of stairs without risking broken limbs or worse. It takes a well trained team.

But the thousand and one lighter objects in a household really comprise most of the chore. If you don't mind hard work, you can move them.

What you'll need. Full-time movers

When you move . . .

Pack plates and saucers on edge.
Pack stemware upside down.
Secure record-player arm.
Wrap sharp garden tools.
Bolt down refrigerator unit.
Drain garden hose.
Remove handles from bicycle, lawn mower.
Line boxes for books with paper.

Never, never, never . . .

Fold innerspring mattresses.

Top TV sets while loading or carrying,
Fold rugs, instead, roll them.

Pack more than six plates together.

Pack inflammable liquids or oil mops.

Slide packing boxes on the floor.

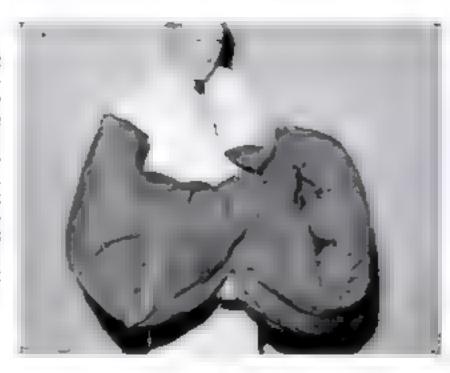
Stand on bare furniture when loading.

Load fragile items on the bottom.

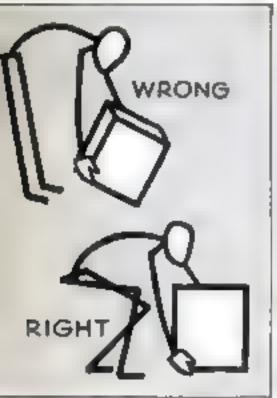
Wrap Light Furniture Before Loading



Fragile tables, light chairs and similar delicate pieces should be wrapped like this. Place the piece diagonally on a quilt. Fold nearest corner over the top, then the side comers, as at left. Wrap fourth corner over legs. Bundle is easy to carry (right). Remember to stow it high on load to avoid crushing.



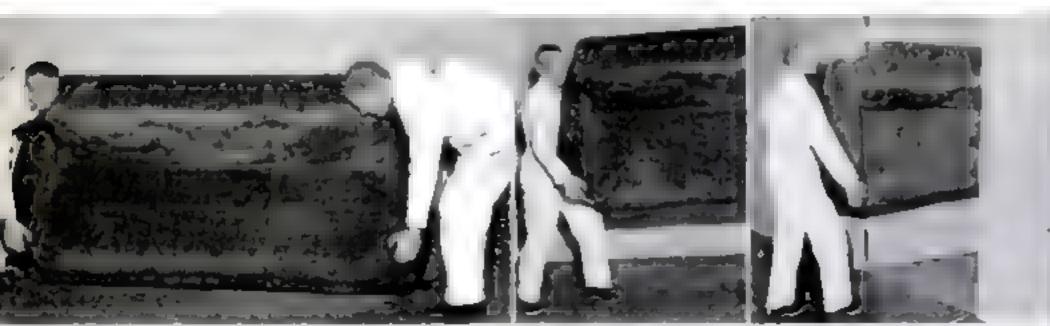
Here's the Way to Rassie the Big Stuff.



Let big leg muscles, not back, do work of lifting heavy pieces. Bend knees, straighten up to lift load



To carry overstuffed chair, stand on one side, place one hand against inside corner of far arm, and grasp outside of arm with other hand. Bend knees, pivot nearer arm against them, and swing chair onto your shoulders. To hook chair around narrow doorway, carry it as at right. Use two-man davenport earry for extra-big chairs.



Davenport is a two-man job. Each man grasps bottom near rear leg, and front of one arm. Piece is tipped forward first as at left, unless it has fragile legs. In this case it must be lifted and tipped simultaneously. Then it's held on the thighs (center photo) while rear hands are

shifted down to what are now the bottom rear corners (actually front legs). You can get such a piece through a door 12" narrower than it is, by hooking it around the easing, one arm at a time, turning it as necessary to take advantage of the best angle.

like Bekins teams carry about \$1,000 worth of equipment, such as tools, dollies, straps, and pads for a whole vanload at once.

Since you won't have all this equipment, vou'll have to handle fewer pieces at a time. With a station wagon or pickup truck for hauling, you'll probably have to make your move in installments anyway. But there are some things you should have on hand.

First among these is lots of excelsior or shredded newspaper, which you should be able to buy at a local warehouse. Don't skimp on this—it may save a treasure.

Collect all your blankets and quilts, and if possible borrow more. You may be able

to rent some moving pads from a warehouse.

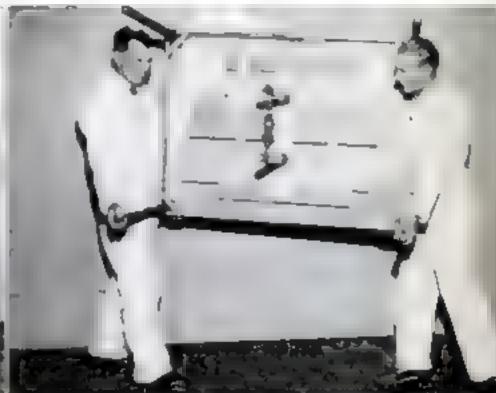
Two handy helps are "shoulder skins" and straps. The skin the experts use is a 7' by 8' piece of mattress ticking, folded diaper-fashion and placed around the shoulders. The ends are wrapped around the hands to protect them against sharp edges, while the center part enables you to get your shoulders under part of the load.

Straps may be lengths of belting or webbing 2" wide. They are used much like shoulder skins, the ends being wrapped around the hands

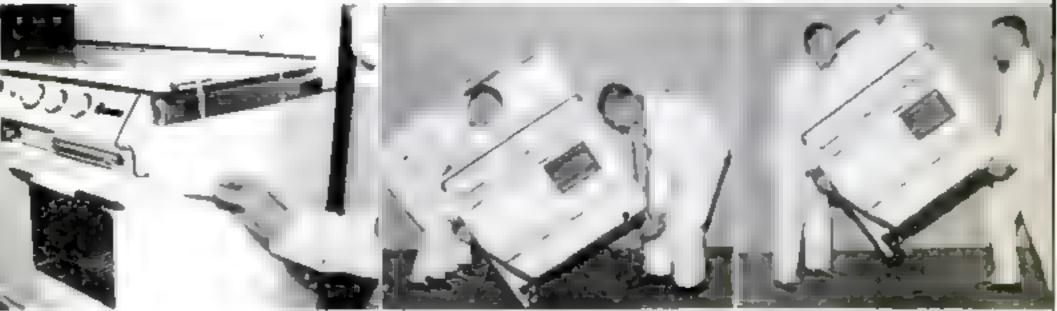
Save your back. Moving is hard work. Don't make it harder by starting with a



Turn tables on edge if they are to go through doors. With a helper, put one hand on the rear edge, the other under the adjacent edge nearest you. Lift and turn the table in one movement to position at left above. Rest it on the thighs while

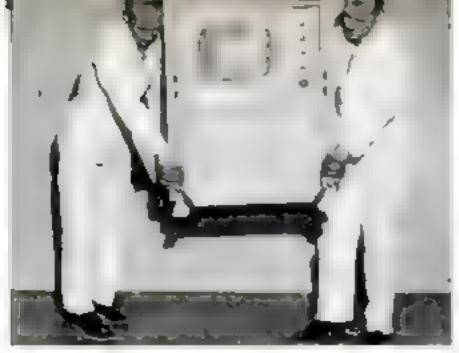


shifting the upper hands down to grasp lower legs near the ends. If doorways are a tight squeeze, drape a pad over the top to protect its finish. To negotiate awkward turns, better take off the legs.



Ranges must be buttoned up with tape or string to hold doors and lids shut. Be sure the oven is empty, especially if the door is glass. Remove the grates and burners and carry them in a wooden box. Straps help shoulder the load, and protect hands. The man on the high end of

the range puts the strap around his neck or on just one shoulder. Bend your legs as shown in the center photo; straighten them to lift. The man on left has part of the weight on the lower portion of his body. Retrigerators can be carried the same way as a range.



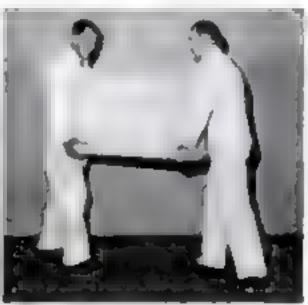
To tote TV sets, use a helper and a pair of straps. Carry set vertically at all times; otherwise you may knock tubes askew. Once on truck, wrap it and load so that screen isn't subject to pressure. The set can go under other things if the cabinet is strong



Heavy chests, awkward to carry with hands alone, are no problem if one man uses strap. Lift chest tilted toward strap, as here, and also tilted back so that drawers won't open. For maneuvering around corners, it may be best to tie drawers shut. They are a good place for carrying draperies and curtains—rolled, not folded, to avoid creasing.







Two men can carry loaded boxes and trunks as heavy as 300 lb. like this. One hand on back edge tilts hox back until second hand can grasp bottom front edge as at left. Men lift together, rest load on thighs (center photo) and shift rear hands down to bottom corners for the carry. On

stairs, tailer man should take lower end to keep load as level as possible. To set it down, one man shifts rear hand back to top, shifts other to let corner down to floor, and both men lower weight by bending legs. Never carry a heavy load behind you.

sprint. Be stingy with your energy, saving the old heave-ho for the times you really need it. Headwork can save you a lot of hard labor, even in the little jobs. For instance, don't punish yourself by wrapping small items on the floor, taking the stance of a bowknot to do it. Work on a table, and sit down to as much of the job as possible.

Things weigh less if the extras are detached. Legs usually come off tables if you unscrew one nut apiece. Gas grates and burners lift out of the range, and heavy chests don't have to be moved with the drawers filled.

If burners, refrigerator shelves, radiantheater units and the like aren't removed from their housings, immobilize them with paper stuffing so that they won't be damaged or mar adjoining surfaces.

Stowing the load. You wouldn't put eggs under canned goods in a shopping bag, and the same principle applies in loading house furnishings. A fragile end table isn't worth much when it has traveled under a davenport or a steamer trunk. A good mover loads with his head as well as his arms.

Bekins drivers say: "The secret of good loading is planning. Think from the top down. What are the key pieces-the awkwardly shaped or fragile ones that offer the greatest problem? Pick other pieces of the right width, strength and height to form a base for these and protect them."

Remember that blankets or pads should be wrapped around vulnerable pieces to keep them from being jarred on the trip.

Good moving!

DO IT THE EASY WAY



To stop blisters if your hands haven't toughened up, ship sponge-rubber powder puffs into the paims of work gloves. Anchor with adhesive tape.



To strain paint, hold the cloth almost taut between embroidery hoops large enough to hit over the top of the can. Then the weight of the paint won't drag the cloth into the can.

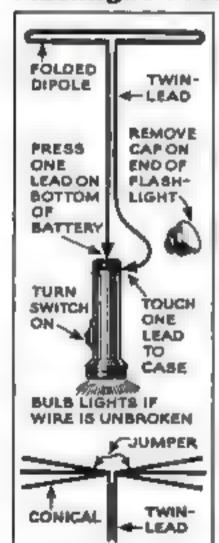


To store a razor blade safely in a desk or cabinet drawer, clamp the cutting edge in a spring-type paper clip. Reverse the blade for cutting

To eatch drips of oil that run down the spout and over the sides of an oil can, solder a washer to the spout. It will intercept drips, letting you wipe them away before they dirty the can.



Flashlight Tests TV Lead

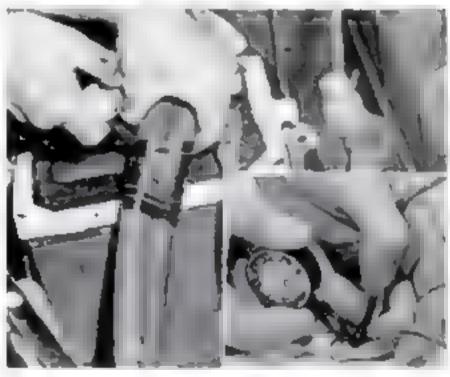


The twin-lead ribbon that connects your television antenna to the set takes a beating from the wind and rain. If you suspect a break in the down lead, disconnect both wires from the set and find out for sure with the simple flashlight test shown.

If you have a foldeddipole antenna, you can make the test without going out of the house. If not, connect a jumper across the arms to complete the circuit. — Arthur Trauffer, McClelland, lowa.

Neg Envelope Softens Flash

Transparent photo-negative envelopes jammed over flashbulbs make excellent diffusers when you are shooting a close-up and want to soften the illumination.



Electrical Tape Fills Two Jobs

An ELECTRICAL tape of glossy black plastic that sticks on contact eliminates the need for double-wrapping splices with rubber tape and ordinary friction tape. A rubber-like ability to stretch over twice its length makes it conform smoothly to odd shapes. Though unusually tough, it's only .007" thick and makes a neat wrapping in tight, small places. It's waterproof and unaffected by oils, acids, prolonged sunlight or intense cold. Marketed by the makers of Scotch tape, it has Underwriters Laboratory approval.



How to Photograph Your Boss

By Ralph Steiner

SOONER or later, every photographer who is worth his hypo is called on to photograph his boss. That's one of life's grim realities, so you'd better give it some thought right now and be prepared to do it well. Otherwise, that next raise in the paycheck may not come nearly so soon.

Successful men have to do a lot of posing for pictures, and successful men hardly ever feel comfortable when facing a lens. I know, because I've dealt with and photo-

Clarence Randall, boss of some 25,000 muscular workers at Chicago's Inland Steel, was no problem once I'd coaxed him out of his office into the plant. The photo was shot for Fortune.



Harold Renfield, liquor importer, freezes for lenses. After I'd made 54 shots, all unlike him, he suddenly unfroze, and the next six shots were easy, informal, happy likenesses.

Louis G. Cowan, radio and TV producer, relaxes way, way down. "Just keep on reading," I told him as he sat with the paper. "I'm doing you as Whistler's Mother." He did. And I did.



graphed a lot of them in my time: Wilson of AT&T, Wilson of General Motors, Greenewalt of du Pont, Folsom of RCA, and many others.

And I've made a lot of mistakes—so, at least, I can tell you what not to do when the day comes that you have to shoot (I mean, snap) the big boss.

Don't Shoot and Run

First, don't make the mistake the plant photographer is so often trapped into. Don't let the boss give you two minutes to shoot and run. The president of Procter & Gamble showed me some rather terrible shots of himself and wondered why they were so bad. I thought I knew. The blame, I told him, probably should rest squarely on his shoulders, not on the photographer's. "How so?" he asked. I closed my eyes and said: "I can see it all in my mind's eye-just how these pictures happened. You pulled your brass on the cameraman, told him to make it snappy. Several electric signs flashed on in the photographer's mind: "TIME SPELLS TROUBLE," 'FOCUS, BANG THAT FLASHBULB," 'GET OUT FAST." My guess turned out to be right.

Film, lens, shutter, flashbulbs operate mechanically, but there's a law that says that to make good photographs a photographer must use brains. And if you inspect the small type in that law, you'll undoubtedly find "the more brains the better the picture." Eastman Kodak up to now hasn't invented

a robot photographer.

How do you apply photographic brains? You have to defeat what might be called the First Gambit, or the Challenge. I meet it whenever I enter a man's office with a camera. He tightens up, hunches his shoulders, gets more sticklike. Or he leans back, pokes his stomach out in my direction and molds his face into an expression that says: "I dare you to take a good portrait of me." In this state he's not fit for anyone's camera. But don't flee. I used to want to. Now I've learned that his rigor comes not from being bearish but from being scared of what the man behind the camera will do to him.

Decoy Diverts Subject's Attention

At this point the books on portraiture advise you to make your subject relax. Easier said than done. Unless you are a Durante or a Bob Hope and can fascinate the boss while making decisions about background,

[Continued on page 262]

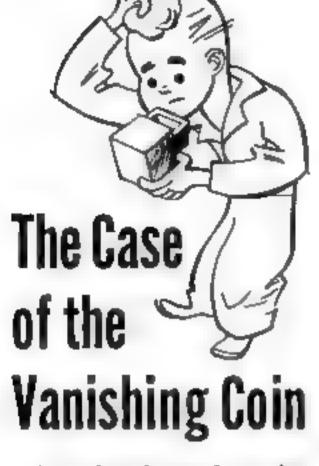




William Lescaze, New York modern architect, is a natural. Accustomed to public speaking, he sits and looks happy for photographers. I took him with one flashbulb in an all-white room.

Paul Newman, a New York advertising vicepresident, is a crack shot and hunter. I tried to show that things keep moving in his head and he always looks cool, starched, shoeshined.



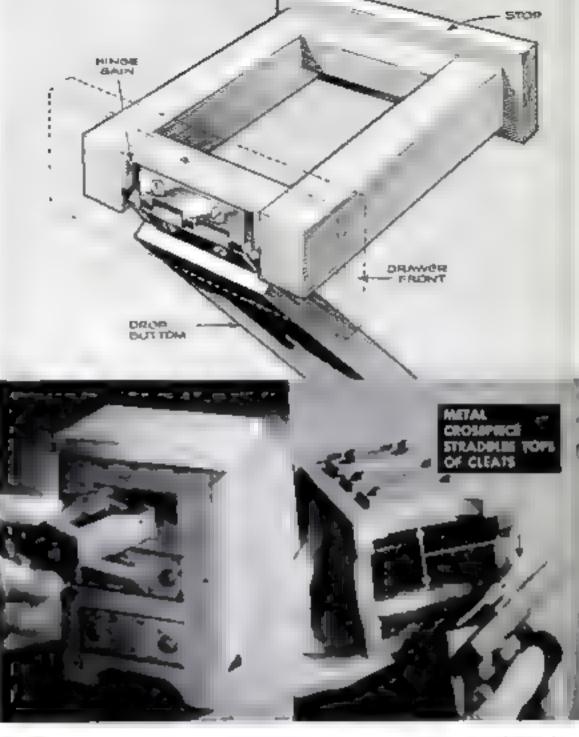


Four bits dropped into this novelty bank disappear faster than a buck at a supermarket, but you get more fun out of it because you've still got the dough

Only the top drawer of this mimature chest slides in and out; the others are dummies. Pop a coin into the drawer, close it, and a hinged bottom lets the coin fall into the

chest. Reopen the drawer, and the bottom snaps up into place again, leaving no clue to the coin's disappearance.

A trick drawer like this can be built into any sort of box or miniature furniture. The back stop, which keeps the drawer from being pulled out far enough to tip its gimmick, must be attached with the drawer in



place. In the chest shown, this was done before the top was nailed on.

To withdraw your savings you could burn up the bank or use an axe, but it's better to have a trap door. Here, it's the bottom of the chest. The crosspiece of a cylinder lock straddles cleats inside to hold it in place.—

I. R. Schneider, Larchmont, N. Y.

Harmonica Makes Drill Rack

THE cover of a 10-cent plastic harmonica will neatly rack up the drill bits and blades for an automatic screwdriver. Pry the toy apart carefully with a knife blade and mount the cover on the wall of your shop with wood screws.—John J. Rea, Urbana, Ill.

Work Gloves Always at Hand

I NEVER have to look for my work gloves any more. To keep them always with me when dressed for work, I sewed one clasp of a snap fastener to each glove and the opposite parts to my coveralls. When I take my gloves off, I just snap them to the coveralls. —Charles O'Brien, Birmingham.

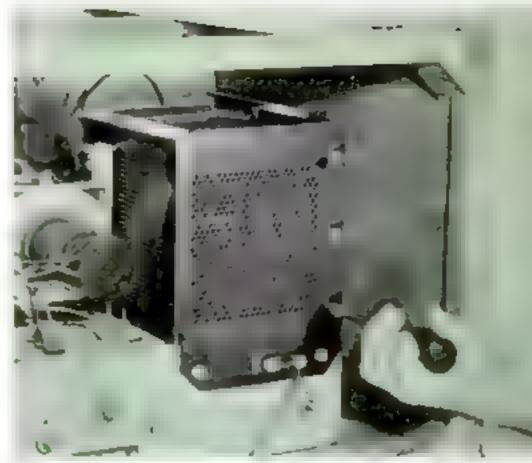


TV Doghouse.



Take a look and see. You won't get bitten if you know how—and it's where you're most likely to spot set trouble.

By Robert Hertzberg



To get inside doghouse on the common 630type chassis, use a small socket wrench to remove screws in back. Line cord is disconnected.

ALREADY TV sets are sprouting their own folklore. One notion kicking around is that anyone who isn't an electronic expert should never go near the "doghouse"—that little steel box on the chassis where the high voltage lives.

Don't you believe it. The doghouse need not be dangerous. And the amateur repairman who avoids it may be missing a bet, because the tubes in it are among the most vulnerable in the entire receiver.

If the other tubes are working all right (see PS, April '51, p. 209), and if the sound is coming through, a dark picture tube can be traced directly to the doghouse in 99 cases out of 100. As a matter of fact, you ought to be familiar with the doghouse in your set. Otherwise, something like this may happen:

One day the picture tube goes blank. You check the line cord and antenna; all okay there. So you pull the chassis and check the tubes outside the doghouse, all okay there. "Oh-oh," you say, already feeling pain in the pocketbook. "the picture tube's blown." Then you call the serviceman. He replaces a bad tube in the doghouse and the set works fine. It leaves you with a why didn't-I do that feeling

Safety Rules. Nobody wants to scuffle with 15,000 volts. So make it a rule not to plug in the set with the doghouse open. There's one exception to this—when you want to see if the doghouse tube filaments light up—so be particularly careful to keep your hands out then.

The second rule is to discharge the high-voltage condensers in the picture-tube curcuit after you turn the receiver off. Locate the single well insulated wire from the doghouse to the side of the picture tube and pull it free where it joins the tube. Allow the fastener at the end to touch the chassis, thus discharging the high-voltage condensers. You may see small sparks jumping to the chassis. Be sure to put the cap back before you turn the set on.

What you need. A few common hand tools, the manufacturer's service notes for the set, and possibly a "cheater" are all that's necessary for troubleshooting in the doghouse. The service notes are important, as is a tube manual that lists the tube heater pins, allowing you to make a simple series check of the filaments. A cheater is a length of 115-volt wire with a plug on one end and fittings to match the set's power-supply connection at the other.

Doghouse construction varies considerably. In some receivers the compartment has a simple cover that yields readily to a screwdriver or pair of pliers. In others, you may have to remove eight or ten screws from the sides and edges. Some newer sets compartmentalize the doghouse in an area under the chassis. In most sets the power



Back and top now slide free. Line cord comes off, too. If you don't have "cheater," drill out rivets connecting plug to the cover.

Parts inside are now exposed. Freed plug now acts as "cheater." Keep hands off with power on. Replace rivets with screws on reassembly.

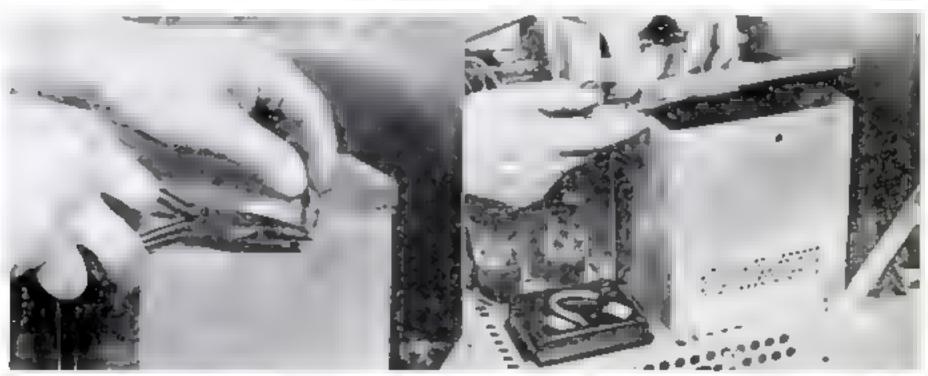
cord comes off with the rear chassis guard or the doghouse cover.

Dust it out. The first thing you'll notice is the thick coat of dust inside the dog-house, attracted by the heat and high voltage. Clean out the box with a soft paint-brush, but don't wield it too vigorously. Now plug in the set, turn it on, keep your hands well clear, and take a good look at the tubes.

You can pretty well expect that the highvoltage rectifier, which you can identify from the service notes, will be dark. In many sets this is a 1B3GT. Remove it and make a continuity check of the filament (a series link-up of a single dry cell, a pair of earphones, and the filament pins is one easy way). If its filament tests "open," the tube is simply burned out and a new one is needed.

Circuit oddity. It is entirely possible, however, for the tube to be in good shape. Then a brand-new 1B3GT put in the same socket will likewise fail to light. This is due to an oddity of many TV circuits.

In most sets, all tubes except the highvoltage rectifier receive their filament current from the low-voltage windings on the regular power transformer. The rectifier gets its filament current from a special transformer associated with a tube marked

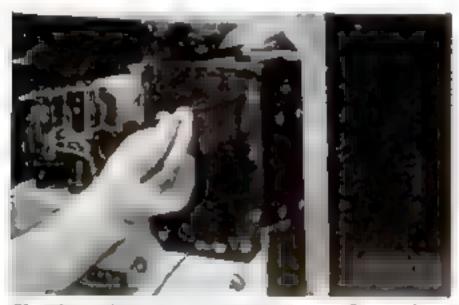


Can-type doghouse is opened by removing ball chain and gently prying off lid. Be sure juice

is off, condensers discharged. Take care not to bang hid or tools against picture tube.



Brush out dust with soft paintbrush, but don't injure fragile leads. Leave wires in same position you found them. If a tube has a spring socket, press collar on base to release it.



Slender plastic screwdriver is used to adjust width or linearity control in doghouse. This is done with doghouse reassembled and power on. Never use a metal tool for this job.

either "high-voltage oscillator" or "horizontal sweep output." If this tube goes bad, the rectifier gets no filament juice and fails to deliver high voltage to the picture tube.

Tube failure means more than just a burned out filament or heater. It is common in TV servicing to encounter tubes that light normally and yet simply refuse to work in certain critical positions. Among these are the oscillator and horizontal output stages, the usual tenants of TV doghouses. It isn't uncommon to find an oscillator tube that decides to stop oscillating after a year or so, although it does fine if switched to the sound end of the receiver.

After replacing doghouse tubes, be sure you remember to replace the high-voltage lead to the picture tube that you pulled

to ground the condensers

In most TV sets, replacement of the doghouse tubes won't require readjustment of the various picture controls. At most, slight readjustment of the focus control may be needed. In some sets a control marked "linearity" or "width" is inside the doghouse, and is accessible through a small hole in the case. After you have the set buttoned up again, tune in a test pattern and, using an all-plastic screwdriver, carefully adjust this control. As with other picture controls, it's smart to mark the adjusting screw's original position before you change it. END

Got a sick car radio? See PS next month for simple ways you can cure it.

VACUUM CLEANER

If it will not pick up (upright type), the cleaner bag may be filled or badly clogged. The rotating brush may be worn or improperly adjusted so that it does not brush the surface being cleaned. The brush drive belt may be loose or broken. The nozzle may not be adjusted to suit the floor being cleaned. Adjustment is correct when a half dollar can be slipped under the nozzle edge between the nozzle and the fug. Low motor speed will reduce cleaning efficiency. If the motor runs slowly, it could be because of had bearings, worn motor brushes or poor motor connections

lf it will not pick up (tank type), the cleaner bag or filter may be clogged. The wrong cleaning tool for the job may have been selected. The cleaning tool may be improperly used. Light pressure and slow, steady strokes do the job better than heavy pressure and rapid strokes. Low motor speed will reduce cleaning efficiency of this type too.

If it will not run, there may be an open circuit to the cleaner motor. First make sure the house circuit itself is not at fault. The break may be in the plug, the cord, the switch or the motor. In the motor, an open circuit could result from a broken wire, loose connections, worn brushes, worn or dirty commutator or open field.

If it is noisy, the bearings may be dry, tight or worn, the motor armature shall may be bent so that the armature is rubbing on the pole shoes. A loose, bent or broken fun will cause excessive noise. On the tank type of cleaner with two fans, noise may result if the fans are out of balance. They can be balanced by loosening the fan nut and turning the outside fan one-eighth turn, then tightening the out again. Repeat until the cleaner runs quietly.

(From Electrical Appliance Servicing, by William H. Crouse.)

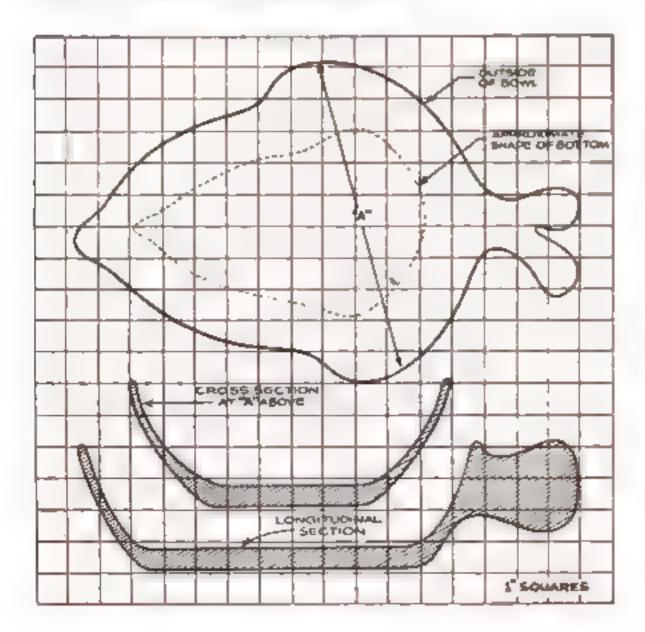
FOR YOUR POPULAR SCIENCE INFORMATION FILE



How a Craftsman Carves a Bowl

It takes effort, but the handsome results are worth it.

SHAPING bowls from many varieties of wood has been a long-time hobby of Edward H. Mason, supervisor of the Roosevelt National Forest. He admires the rich grain and color of fine wood and enjoys ferreting delicate shapes from twisted branches and knotty pieces. He does all his carving by hand. The photos here and on the next page show the steps by which he turns a slab of hardwood 2" thick into the handsome acorn bowl above.— David F. Costello, Ft. Collins, Colo.





Mason first draws the outline of the bowl, using separate templates to mark the inner and outer edges. He uses a third template on the underside to outline the bowl bottom



2 Carving can start anywhere along inner line. Mason first makes shillow cuts, then works down steep-sloped sides. As he nears the bottom he checks the depth with calipers.



3 An electric hand grinder quickly smooths the gouged out sides and bottom and shapes a lip at the tip of the bowl so that it may be used for pouring [Please turn the page]







4 Inside of bowl is sanded smooth and a coat of lacquer filler is rubbed in. Mason finds it more convenient to finish the inside before starting to shape the outside of the bowl.

5 Roughing the outside.
Muson uses a handsaw, then a coping saw to hew off surplus wood until a crude outline of the finished bowl begins to appear. Gouges help on some curves.

The outside is shaped with rasps until the edge is %" thick and the bottom %". He's careful to caliper the work frequently, especially toward the end. Sandpaper smoothes the rough rasp bites.

The handle is left to last and it, too, is shaped in stages. First the coping saw follows the outer curving lines, then small rasps cut in details and round off the outer surfaces.

The electric grinder completes the shaping and evens off all rough spots. The handle and outside of the bowl are then ready to be sanded, coated with lacquer filler, and sanded again.



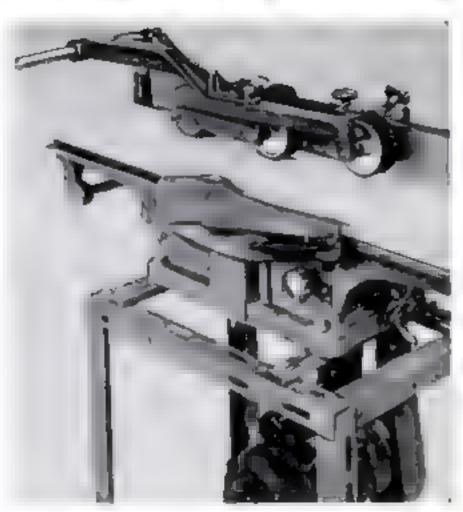






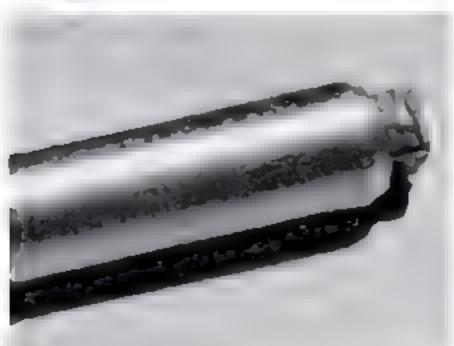
222 POPULAR SCIENCE

X New Tools



Hold-Down for Jointers. The roller system of this attachment holds stock against the jointer fence and table without effort by the tool operator. After the work is started under the first roller, a push stick is used to feed the work. The rollers, slightly toed in, track the stock snugly against the fence and also keep it planing flat and accurately. Duro Metal Products Co., Chicago.

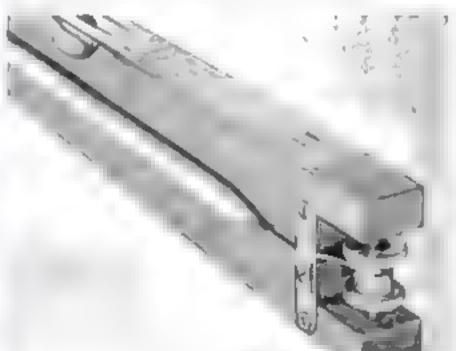
Dresser for Grinding Wheels. Boron carbide—the hardest substance known, except for the diamond—is used as the point of this tool. The boron carbide insert is held in a 5" aluminum handle. The tool can dress medium-hardness grinding wheels that are 10" or less in diameter. Robert Marks Co., Providence, R. I.



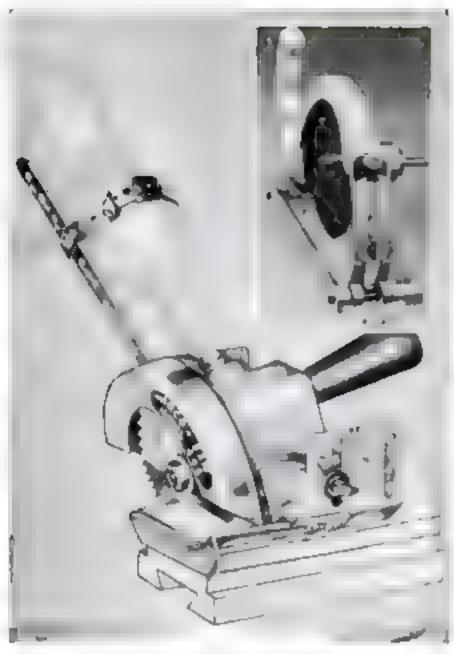


Removes Paint, Wallpaper, Putty. You also can use this tool in laying asphalt tile. It heats to its operating temperature, near 1,000° F., in about three minutes on AC or DC. B & L Tool and Machine Co., Plain-cille, Conn.

Level Sets Pipe Pitch. The angular adjustment on this 20%" level helps you set pipes and drains to the pitch you want. In use, the gauge is turned to the desired pitch and the level is placed on the pipe. When the pipe has that pitch, the bubble will center. To get the pitch, divide the total fall by the length of the run. That figure is set on the adjustment at one end of the level. The other end is hinged. Set to zero, tool is an ordinary level. Dreier Bros., Chicago.



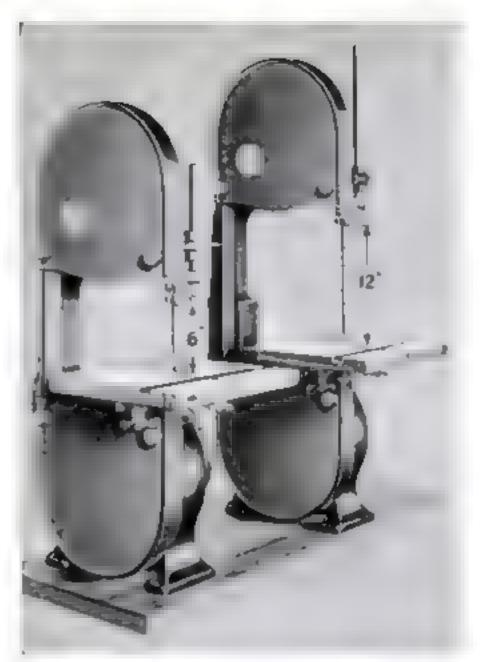
Please turn the page for more new tools.



Saw Attachments Cut Miters. Both of these attachments for electric drills can be set to saw bevels up to 45°. Besides the bevel gauge, the one in the larger photo above—made by Arrow Metal Products Co., New York City—has rip and depth gauges. The other (insert) is marketed by Cardinal Creations Corp., Long Island City, N. Y.

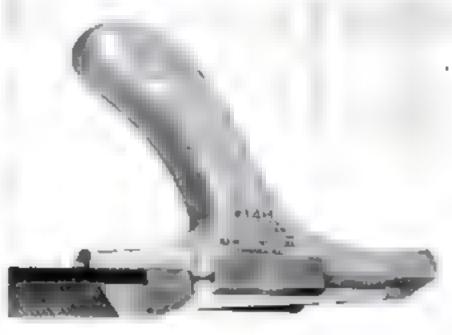
Power-Tool Kit for Home Use. Included are a 6" sander-polisher that can be used as a %" electric drill, seven twist drills, a 3" grinding wheel, bench stand, hex key, chuck, sanding disks, lamb's-wool bonnet and a steel carrying case. Skilsaw, Inc., Chicago.





Attachment Enlarges Bandsaw. Delta bandsaws with a 6" capacity can be stepped up to 12" by use of that company's height attachment (right above). It consists of a cast-iron raising block and the necessary fittings. A longer hexagonal guide post is included. Delta Power Tool Division, Rockwell Manufacturing Co., Milwaukee.

Handle for Files. This handle provides a comfortable grip above a file, leaving the entire cutting surface of the file unobstructed. The file is mounted by driving the tang in the steel V block under the wooden handle. Remont Manufacturing Co., Lombard, Ill.



224 POPULAR SCIENCE



I Shovel Snow with a La



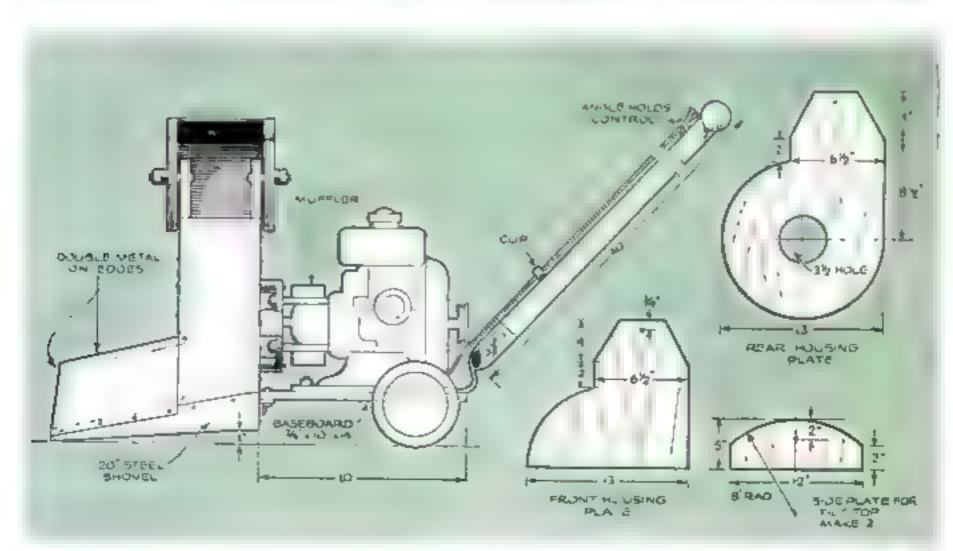
with a Lawn-Mower Engine

Blizzards needn't mean backaches if you hitch gasoline, instead of your sacrolliac, to the snow shovel.

By Howard G. McEntee

THOSE big rotary plows clear snow from the highways with impressive ease. My midget works on the same principle. It's not meant for Minnesota drifts, but it can handle snowfalls under 6" deep and will even take care of heavier storms if you don't mind running it back and forth during the storm

Building the plow gave me a chance to use a lawn-mower engine that would otherwise be standing idle. Now, before cold weather arrives, I simply transfer the engine



-a 1.2-hp., two-cycle job-from mower to

plow.

When a storm comes, I roll the plow along my walk and driveway, scooping up the snow while the engine drives a whirling rotor, throwing the snow up and to one side by centrifugal action.

Materials used. Wood parts were all cut from %" exterior (weatherproof) plywood except the baseboard. Here, I used the X" size for additional strength. The rest of the housing is sheet metal, with some angle iron to join or reinforce various parts.

For the scoop that is pushed into the snow, I chose a heavy old steel snow shovel. This is better than an aluminum one, since

the steel is stronger.

Making the scoop. I kept the steel edging and underneath braces of the shovel to maintain stiffness. The back edge was cut and bent to fit around the wood housing plate. The shovel should be nearly level, just enough incline so it clears the sidewalk at the rear when the wheels are in place. Two wings or cheek pieces join the scoop and housing rim.

Roundhead wood screws hold the metal to the plywood plates. I made the many sheet-metal holes required with a hand punch, which is much faster than drilling. I used washers wherever nuts or bolts bear

against the wood.

The rotor. Mounted on the motor shaft, the rotor required careful construction and exact balancing. An unbalanced rotor could

shake the plow to pieces.

But balancing isn't difficult. During the course of building and changing designs, I had to rebalance the rotor several times. Smooth running showed I hit it well each time. Lock washers secure all nuts used in assembly.

Final details. Express-wagon wheels of 6%" diameter were used. Wheels with fatter tires would be better, for mine tend to stick in ruts. The handle came from an old lawn mower, as did the strap-iron pieces that hold it. These were heated dull red with a gasoline blowtorch, then twisted and hammered to the desired shape.

An auto choke wire, linked to the pivoted arm, controls the throttle. Radio spaghetti was slipped over the wire to protect it from moisture. Actually, the centrifugal governor controls the throttle, and the hand control limits governor action. The governor helps keep engine speed steady when the plow is pushed through snow.

226 POPULAR SCIENCE



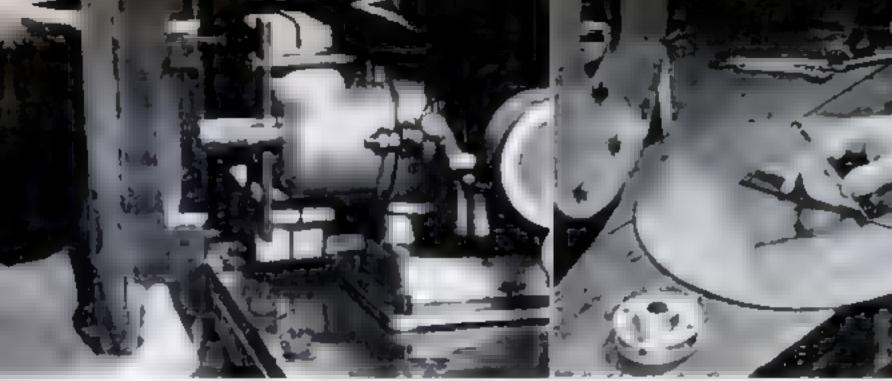
Engine was mounted with shaft projecting beyond one side of %" by 10" by 14" baseboard, bolts holding it in place. To support rotor housing, a piece of strap iron was attached to governor-shell boltholes. Two long screws and pipe spacers hold it alongside shaft.



Rotor blades, 3%" matched lengths of %" by 1%" by 1%" angle iron, are mounted with 4"-20 bolts. Blades are spaced 90" apart with vertical flanges radial to center of disk and the ends all equidistant from disk edge. Hub must be carefully centered for good balance.

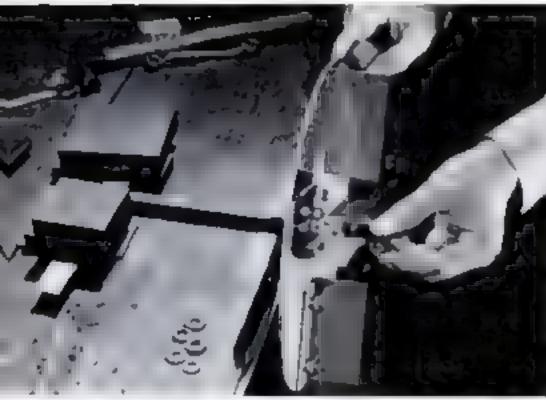
Front edges of housing sides were bent over and punched for bolts that secure front plywood plate (here held in hands). This piece has a length of angle stock bolted to bottom edge for reinforcement. Iron takes shock of small ice chunks, prevents damage to wood.



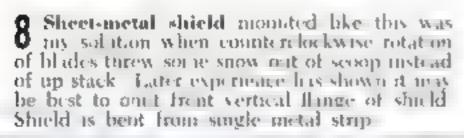


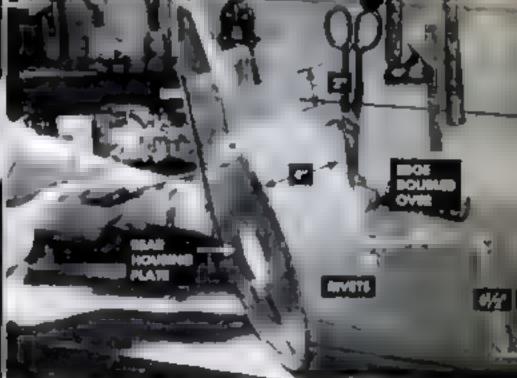
2 Shown in drawing was then fastened to strap from Two 2"-20 series, run through plate and wood spacing blocks, were turned nationals tapped in strap ends. Plate was also boited to angle from bolted under base.

3 Rotor consists of 125" disk cut from X" alumination a 3" east-iron V pulley (used as a hub) and four heavy angle-iron blades. Here, disk center is being found with combination square. I avoided a die-cast pulley for hub; it might fly apart under centrifugal force



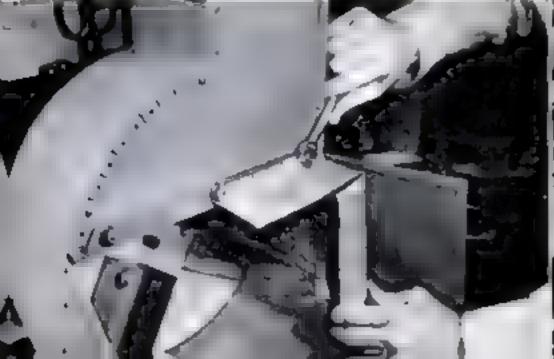
5 Balancing the rotor. Best a 5" shaft on steel rule at edge of bench weight down second rule over end of shaft. Slip washers on bolts until rotor stops at different place every time you spin it. Then take off mits and clamp washers on

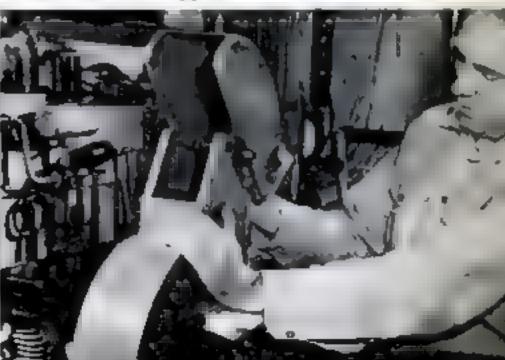


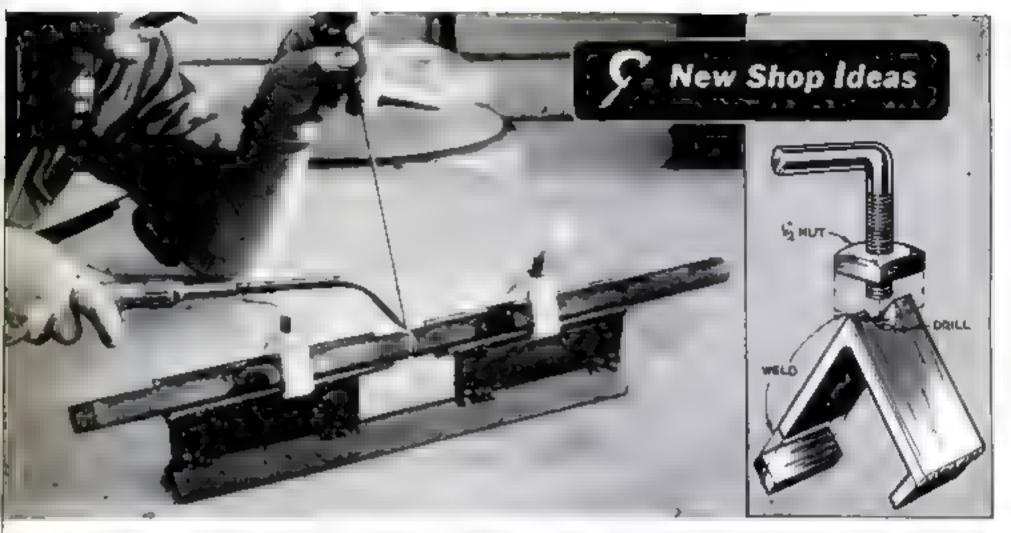


6 Making the scoop. Rear housing plate was removed to attach scoop and housing sides Steel snow shovel was bent at rear to conform to housing curve. I this cut in edge were bent over and fastened to plate with wood screws Wales were riveted to scoop sides, housing rim.

9 Tilting top, made of two pieces of plywood with curved sheet-metal bond joining them, pivots on two bolts set into stack. Bolts are drawn up just tiglit enough to hold, so I can swing the top and direct stream of snow to whichever side happens to be best.







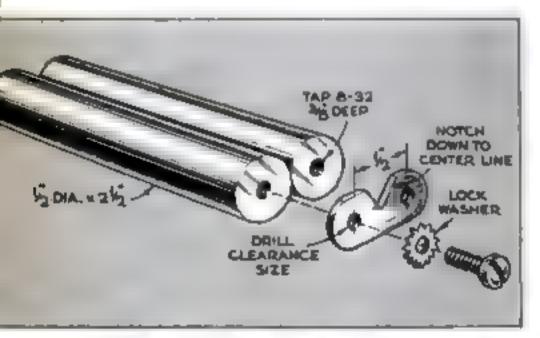
Welding Butted Ends. A jig for welding rods, pipe, and bar or angle stock end to end is itself a simple welding job. It holds two pieces of the same size in perfect alignment and permits welding entirely around them.

Weld two pieces of 2"-wide flat stock on top of a length of angle iron, leaving 4" between them. Make two clamps by welding nuts to short sections of large angle and adding small pieces to the ends as in the drawing. Cut the heads off two bolts and bend the shanks into handles.

With the clamps, secure two lengths of angle iron to a piece of shafting or pipe to align them, leaving a gap of 2" between the ends. Then weld the clamped angles to the top edges of the flat pieces.

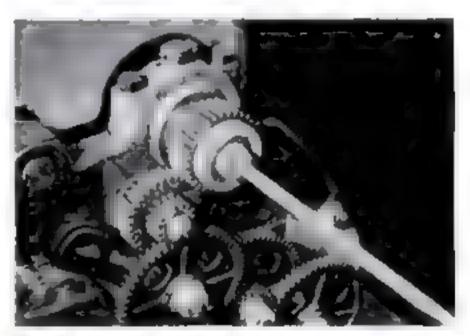
To hold two rounds of unequal diameter concentric, bush or shim up the smaller one.

-Herman Adolf, Richmond, Calif.



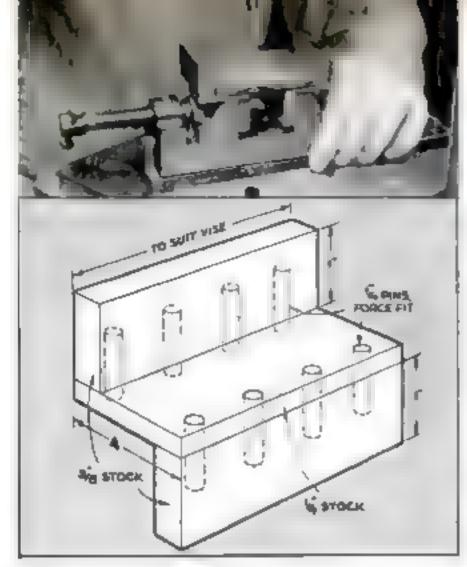
V Block is Renewable. Costing little to make, this V block can be renewed as it wears simply by turning the round bars to expose new working surfaces.

Face the ends of two pieces of bar stock to equal length, centerdril, and tap 8-32 to %" depth. Cut two end links from 1/16" or %" flat stock. Clamp them together and drill through both at once, spacing the holes just the diameter of the bars apart. Assemble with the bars held down on a flat, true surface.—Harry D. Cousins, Chicago.



Bushing Stops Whip. It's risky to let a rod extending through the lathe spindle whip around. Besides putting a heavy load on the chuck, it may bend and flail about dangerously.

To play safe, find a bit of dowel or a wooden plug that's a light drive fit in the end of the spindle. Chuck it and drill through a close fit for the rod to be turned. Tap the resulting bushing into the spindle. If it's a trifle loose, wrap it with paper first.—Will Thomas, Buffalo



Enlarging Machine Vice. Sometimes you bite off more of a job than your drill-press or milling-machine vise will chew. Instead of fussing with blocks and hold-downs, make these extension jaws to take over where normal vise capacity leaves off.

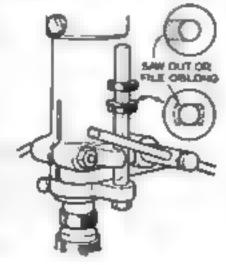
Cut six pieces as long as the vise is wide, but make the width A in the drawing such that, when the vise is closed, the extension paws will have the same capacity as the vise alone has wide open. This gives you an uninterrupted size range. Drill the pin holes for a solid force fit.

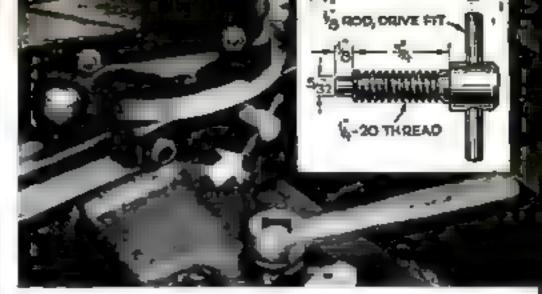
Such jaws will hold flat or square pieces for normal machining, but aren't recommended for heavy milling or shaping, or for odd-shaped work.

One-Hand Depth Setting. A keyed washer between the stop nuts on a drill-press depth gauge saves time in making frequent depth adjustments. With such a washer, the lower nut will stay put and not turn while the lock nut is tightened on it. The

adjustment can therefore be made with one hand while the other is occupied

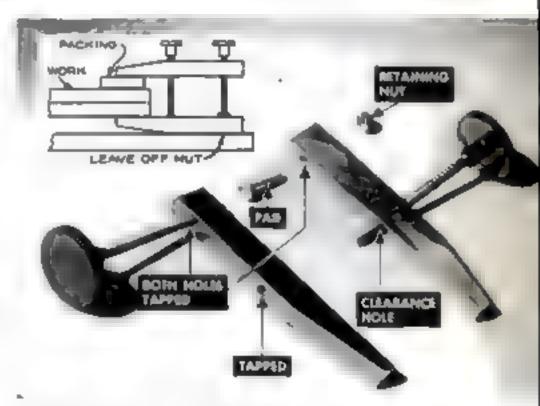
Simply alter an ordinary washer as shown in the drawing. File the opening to a slip fit over the flats on the threaded rod.—
Fred Lettino, Astoria, N.Y.





Quick Gib Adjustment. After adjusting the lathe cross slide to move without play, you may have to lock up the gibs for miling or some other job requiring a rigid setup. To avoid such frequent readjustment, replace one setserew with a T bolt.

You can turn and thread one from stock, or shoulder down a cap screw. Drive in a bit of rod as a handle. Set the other screws for cross-slide travel, making any tighter adjustment with the T bolt alone.—Harry L. Truchelut, Atlanta.



Clamp Works Two, Ways. By tapping through where the outer screw of a parallel clamp bears, you can use both screws in one paw. Clamped work can then be held on a machine table without the screw getting in the way. If the through screw protrudes, substitute a shorter one or insert packing.

For maximum convenience, alter at least two clamps. Drill through and tap the hole. Make a pad, from a bolt small enough to slip into the hole, for the screw to bear against. Retain it with a nut.

The clamp shown is fitted with 1%" knurled knobs that will hold most jobs when turned finger tight, eliminating the need for a rod. Turn knobs from bar stock, tap, thread them on, and pin.—Floyd McGuckin, Ridgewood, N. J.



Heat That Travels Like Light

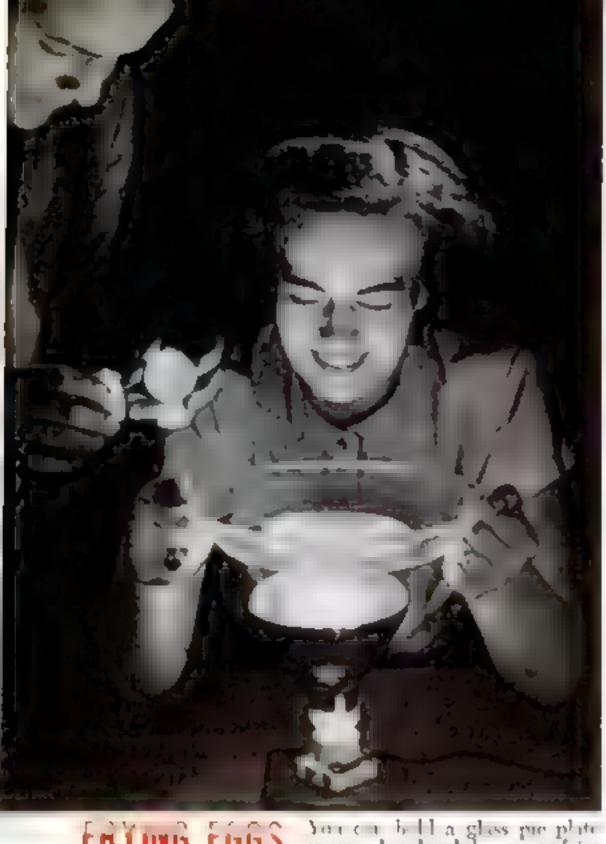
OLD as sunlight, radiant heat is the key principle in the latest broilers and home-heating systems. With inexpensive reflector bulbs, it's at your command to do such heat tricks as keeping you warm in a cold room or drying paint from the inside out.

What's different about it? Touch a red-hot poker and conducted heat tells you about it. Above a radiator, you feel a warm air current—convected heat. Ride past a bonfire in a train and you feel a flash of warmth, gone in a split second. That's radiant heat, traveling with the speed of light.

Radiant heat is transmitted as electromagnetic waves, the same as light, radio and X rays. These waves cross the immense vacuum of space between us and the sun. They also pass unchanged through anything transparent to them (air for instance), so the coldest winds can't cool them. But when they but something opaque, they are absorbed, made to release their heat energy, and things get hot.

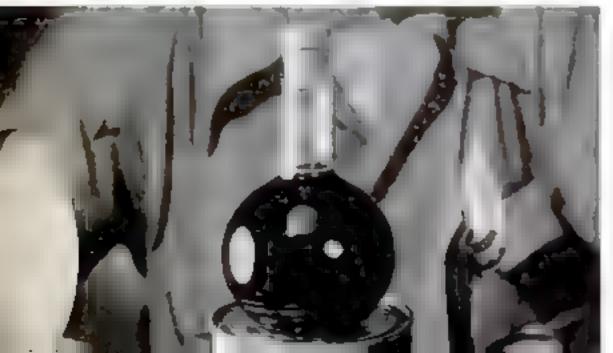
Prove it with bulbs. You can demonstrate the difference between radiant heat and other forms with one or two 250-watt reflector in frared bulbs, or even ordinary storewindow reflector bulbs, which radiate plenty of heat energy. And when you're through with the experiments, put the lamps to the practical uses shown on a following page.—Kenneth Swezey, Brooklyn.

238 POPULAR SCIENCE



in it. Radiant heat goes through the glass, scarcely warming it. The egg, more opaque to infrared mys, absorbs heat and is cooked. Hadiant heat dries thin paint films from the inside out because, like the egg, they are semi-opaque to these heat waves.

BLACK LENS What's opaque to light may be transparent to infrared rays. If you fill a 300-milliliter chemical flask like this one with water, it will focus the beam of a heat lamp into a bright spot, but the spot will be hardly warm. The water passes light, but in this thickness absorbs most of the infrared wave lengths. Fill the flask instead with carbon tetrachloride, adding 3 grams (1/10 oz.) of iodine to turn it dark. Now you'll quickly snatch your hand out of a fiery focus you can't see Black paper held there bursts into flame. The dark carbon tet blocks visible light, but passes radiant heat quite freely.







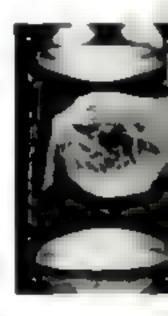
HEAT SHADOW Like light, infrared rays travel in straight lines. Therefore objects that block them will east shadows outlined in heat. Dot a piece of cardboard with candle wax all over and set it up in front

of a lamp, with a strip of cardboard between as at left above. Soon the wax dots on either side of the shadow cast by the strip will melt, while those in the shadow remain firm. That's why beach umbrelias temper the sun's heat.

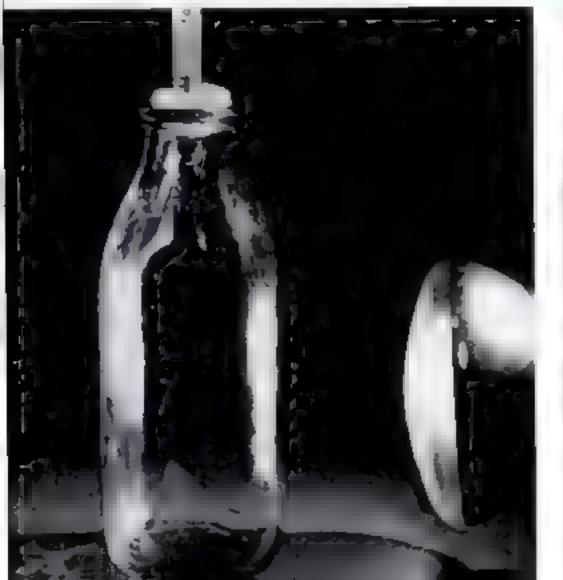
GREENHOUSE Some things are more transinfrared radiation than to another. Class, for example, passes short waves from but sources like the sun, but blocks longer infrared waves from bodies that are only warm. Rad ant heat readily enters a greenhouse to warm soil and plants, but can't escape back through griss because it has been transformed to a lower temperature at a longer wave length

Wind cloth around a thermometer to make a tight scal in the neck of a nelk bottle. Jurn an afrared bulb on the bottom of the bettle. The air temperature will keep issued, a though the glass and the air insice are heated slewly, herause they lose heat even more slow v. Bashations from the warm air are too long in wave length to get out through the glass.

POPPING CORN Your friends will be almost too surprised to eat this popcom when they see it popped in ecllophane. Wrap some popping corn in clear cellulose tissue from a bread wrapper or pack of eigarettes and suspend the bag between two infrared lamps so that it touches neither of them. The corn blocks and absorbs the infrared rays and therefore becomes hot. Celtophane, almost transparent to the rays, stays comparatively cool.



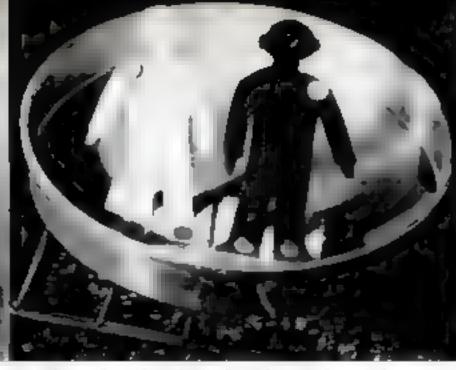
You can reflect radiant heat just like light. A shaving mirror or even a sheet of bright metal set at an angle in front of a built will direct the heat wherever you like. The bulbs themselves contain a parabolic reflector, made by silvering the glass shell. You can make home radiators more efficient with aluminum foil behind them to reflect heat into the room.



Please turn the page for more stunts.

OCTOBER 1951 231





CLOTHING

Illow much the sun warms you depends largely on the color of your clothing. White and light-colored clothes reflect radiant heat away from you, help keep you cook. Dark ones absorb it, making you warmer. One of these mannikers is cut from white cardboard, the other from black A separate arm is stuck to each in an openised position.

With a thumbtack and a drop of wax between.

When both figures are put in front of an indrared lamp, the fellow in black drops his arm before the one in white, as at left above, for the dark one absorbs heat faster. Put both figures in an oven (right) where they are heated by conduction and convection, and both arms will drop about the same time.

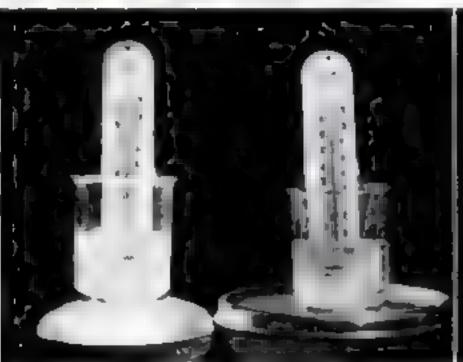


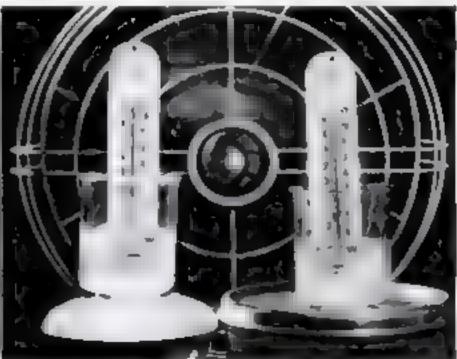
RADIATORS Anything hot is losing some heat by radiation. Surfaces that absorb radiant heat best also radiate it fastest. Those that reflect it readily are poor radiators. To show this, blacken one of two tin caus over candle Fill both with boiling water.

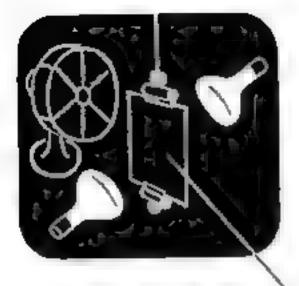
You can stick a finger in the blackened can much sooner than in the show one, which radiates heat away more slowly. That's why heating radiators should be painted a dull and preferably dark color for top efficiency, and why utensits used on radiant burners ought to have black bottoms to absorb heat, and shiny sides to reduce loss by radiation.

THE BIG DIFFERENCE This conclusive stant will show you how radiant differs from convected heat Fill two beakers with alum solution and put a thermometer in each. Place one over an infrared billh, the other over an enclosed-top electric hot plate that has been preheated. Rest the beakers on short pieces of heavy wire to raise them above the heater surfaces a trifle.

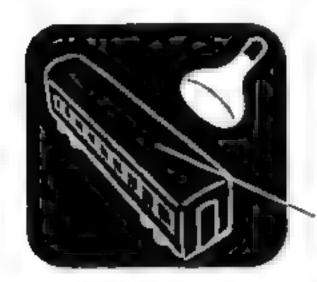
The temperature of the solutions will soon rise, with the one on the bot plate probably gaining (left). Now set up a fin to blow through the spaces under the beakers (right). Almost instantly, the thermometer over the hot plate stops rising and soon goes down, Convection is disturbed by the draft, and heat no longer reaches the solution. The other thermometer keeps on, for air has no effect on radiant heat















10 Uses for Infrared Bulbs Around the House

Film dries fast between two bulbs 18" apart. Fan prevents overheating and speeds evaporation. Harden the film in chrome alum before drying.

2 Quick meals. A bulb will thaw frozen foods in a hurry. It's a lifesaver when guests are coming or supper has been started late.

3 Take chill off bathroom with heat-resistant lamp in wire guard. These are made for use in spots where spattering water might break other kind.

4 Soften up paint for removal with a bulb held close. Then scrape it off. This won't work on painted metal, however, or on heatproof paint.

5 Paint and touch-up jobs done with lacquer or enamels (not with oxidation-drying paints) dry hard quickly under lamps, and pick up less dust.

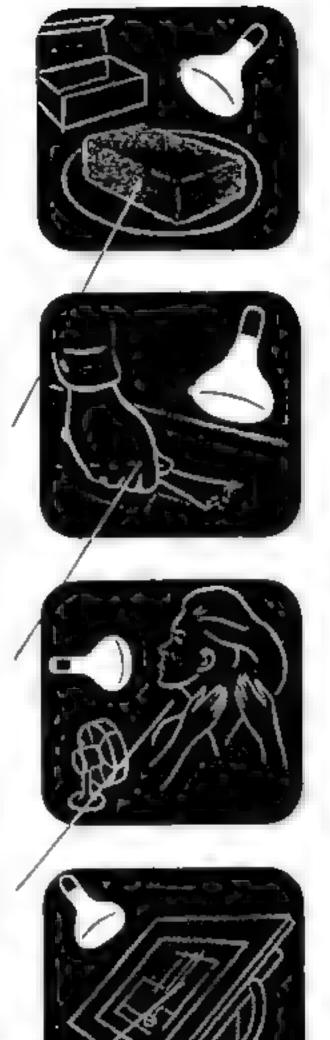
Tell the girls they can be on the dot for dates by using a heat bulb and a small fan to hurry drying when they wash their hair or apply pail polish.

Cold-morning starts are easier on your car if you warm the carburetor first. A bulb aimed at the crankcase will also keep oil fluid.

8 It's an art to turn out inked drawings in a rush. A heat lamp dries ink fast. Erasing and crosshatching can thus be done right away.

9 Work in a harn or other cold place? Infrared lamps won't heat it, but will keep you cozy if you spot them right and stay in the beam.

10 Thermoplastics bend readily if heated in an infrared beam. Heating can be restricted to a small area with a shield as shown here.







The dispenser can be fastened inside a drawer with angles. Place it so the cutting edge is level with the lip of the drawer.



The top edge to which the cutter is nailed is X" higher than the cover. Raising the cutter makes it easier to pull and tear the paper.

Wooden Container Dispenses Kitchen Paper from Drawer

You only need use one hand to get a sheet of kitchen paper from this box. It is screwed inside a work-counter drawer to hold it down while you pull out the paper.

The dimensions given in the drawing are for paper rolls 15" long by 2%" in diameter. For rolls of a different size, make the inside of the dispenser the same dimensions as the outside of the carton in which the paper comes

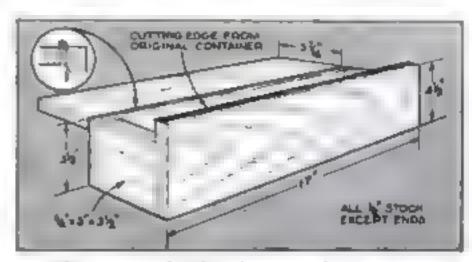
The dispenser is made entirely of %" stock except for the two %" endpieces. The cover, which clears the backpiece by 1/16", is attached with %" hinges; the other parts are glued and nailed together.

glued and named together.

New Unit Spreads Rain Water



PLACED under a downspout or outdoor faucet, this concrete unit fans out a stream of water, keeping it from digging a hole in a lawn or flower bed. A steel web embedded in the concrete makes the spreader virtually unbreakable. It's priced at \$1.75 by Picone Bros., of Brooklyn, N. Y.



The paper knife, the metal cutting strip from a roll's original container, is nailed to the top edge. This edge is made %" higher than the cover so that when a sheet is torn off, a starting strip for the next is automatically left exposed.—Walter Haase, Hartford, Conn.

Envelopes Make Photo Hinges

GLUED flaps on unused envelopes that come as mail enclosures can be turned into photo hinges. Cut rectangular pieces from the adhesive flap, fold them, and the hinges are ready.—Pat Fey, New York City.

Staples Identify Storm Sash

HERE's an easy way to mark wooden storm sash and screens so you'll get the same ones on the same windows next year. Use a heavy-duty stapler to make Roman numerals in the sash and window frames. Brush varnish on staples to prevent rust. — S P Giebelhaus, North Edmonton, Can.



How to Sharpen Circular Saws

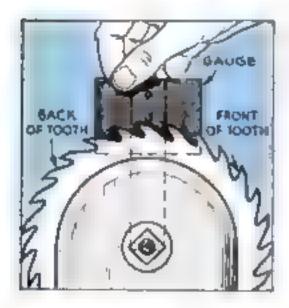
When a blade begins to munch through wood like an elderly beaver, it's time to unlimber a file and touch it up.

By Edwin M. Love

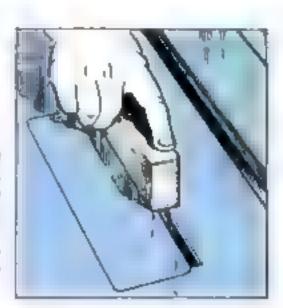
UNTIL science perfects non-dulling steel, circular-saw blades will have to be filed now and then. Don't put off sharpening them. A dull blade puts the brakes on your

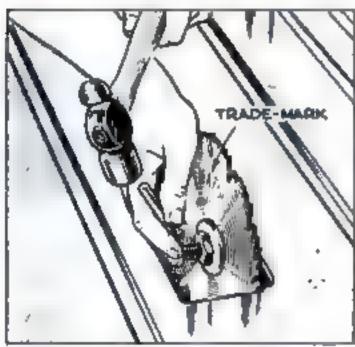
motor, overheating it, and may pop a fuse. Besides, the slow, rough cutting wastes time.

Jointing. As smooth performance depends on every tooth doing its share of cutting, all the points must be equidistant from the center. Jointing, or rounding a blade to even the teeth, is easily done. Adjust the blade or table so the points just graze a whetstone resting on the table insert, start the saw, and pass the stone over the insert

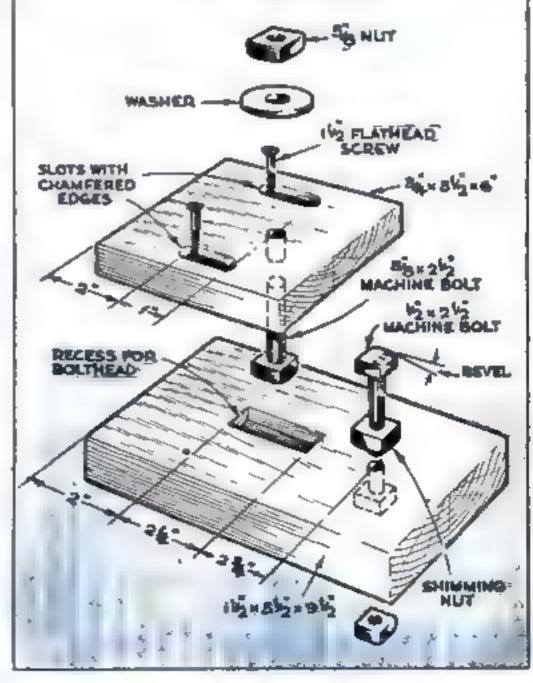


- 1. Maintain original tooth shape. Make a metal template, as shown at left. Trace the tooth form on the head. When sharpening the blade, follow the template to maintain tooth shape,
 - 2. Jointing the blade. Adjust blade so teeth barely project above table. Run the saw and pass edge of oilstone over the blade (right). Teeth should just graze the stone Each tooth should be slightly flattened. If not, raise blade a little more and make another pass with the stone.





- 3. Centering the blade. Before removing blade from arbor, turn it so trade-mark is up. Make prick-punch mark on arbor (above). Always mount blade with punch mark and trademark up. Replacing blade in any other position than one it was jointed in would make it run off center if hole in blade is slightly larger than arbor, or if arbor is sprung.
 - 4. Making a setting tool. Drawing at right shows how to make a setting stake. The %" by 5%" by 6" block shims up blade and permits adjustment for size of blade. Bolt for blade must be same size as hole in blade.

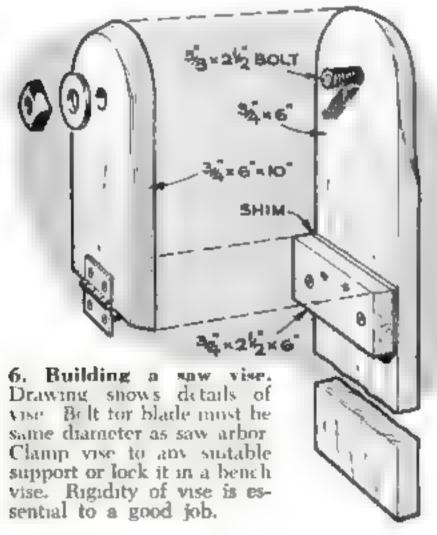


slit. If examination of the blade after it comes to a stop shows that all teeth weren't slightly flattened, repeat the operation with the blade raised a trifle. Before removing the blade, turn it until the trade-mark is up and make a prick-punch mark on the end of the arbor at the top, so you can replace the saw in the same position.

Most blades are spring set—the tips of the teeth are bent alternately to right and left to cut a wider kerf than the saw thickness. This reduces side rubbing. You can measure the amount of set very simply. Stand a try



5. Setting the teeth. Position blade so a tooth is over the anvil. Place end of bolt on tooth. Strike bolt head with light but firm hammer blow. Set every other tooth. Then turn blade over and set the other teeth. Teeth of light blades can be set about one-quarter of their lengths from the points. Set heavy-gauge blades one-third of their depth.



square on the table top with the outer edge touching a tooth point set to that side. Then slip a thin wooden wedge between the square and the saw. Mark the wedge where it won't go in any farther, and measure its thickness at that point. This is the set.

Before filing, it's a good rule to make a T-shaped template of thin metal or plastic, the shank of which is notched to fit against the arbor while two or three teeth are traced on the head. Cut along the line or blacken the silhouette, and use it to check the teeth when filing them.

Setting. You can make your own setting tool. A bolt fastens the blade to a block of wood screwed to a base block that holds the anvil. The anvil is a second bolt with half its head beveled to the angle of set. The anvil bolt is adjusted so that its head is flush with the under side of the blade. With this setup, the blade can be turned so that a tooth lies on the anvil, to be bent down with a bolt driven with a hammer. After setting every other tooth, turn the blade over to set the remaining ones.

Making a saw vise. This is a 1" by 6" board rounded at one end and bored to admit a bolt the size of the saw arbor. Make a short front jaw, boring it to match and hinging it to the first board. With a blade held between the jaws by the bolt, the vise can be clamped against any suitable support, or in a bench vise, while the blade is filed. Be sure the saw vise is held rigidly enough to prevent chatter during filing.

Combination. The most-used blade in the shop is the combination saw, which rips and crosscuts. The simplest form is the modified rip saw. After rounding and setting, clamp it in the vise and file square across the fronts of teeth set away from you. keeping the "hook," or inclination, which generally is tangent to a circle half the diameter of the blade. Use an 8" or 10" mill bastard file with round edges, cleaning the gullets, or tooth bottoms, as you go. Then get the feel of the top bevel of the tooth by resting the file on it, and file to a bevel of 5° across and 19° sloping toward the back, stopping when the jointing flat at the point is gone. Reverse the saw or the vise to file the remaining teeth.

After several filings the gullets must be lowered with a round file turned as it is stroked forward. Strike a guide line on the blade by marking with a pencil as the saw turns on the arbor.

Novelty. The novelty type of combina-



7. Sharpening a combination blade. Use 8" or 10" mill bastard file with round edges. File fronts of teeth (left) first. Sharpen teeth set away from you. Reverse blade to file the others. Leave a little of the flat spot made in jointing as a guide to filing the back of the teeth. Check

with your template from time to time to maintain tooth shape. When filing backs of teeth (center) stop hing as soon as the joining flat disappears. Otherwise, the tooth will be short and it won't cut. From time to time, shape the curved backs of the teeth (right).

tion blade has groups of four crosscut teeth with a rip or raker tooth. The raker is filed square and from 1/64" to 1/32" shorter than the others, and has no set. The crosscut teeth are beveled on alternate sides, the fronts, 18°, the backs 12°, with the fronts radial.

Hollow ground. A planer, or hollow-ground, saw is filed like the novelty saw, but has no set, As fronts and backs of the teeth must be filed separately, a cant file—a triangular file with two sides longer than the third—should be used. If an ordinary taper or blunt saw file must be used, be careful to press only on the tooth being sharpened.

Rip. Rip saws are filed like combination blades, but the backs are usually filed square across. Generally the teeth are larger.

Dado. Dado saws must be jointed as a set, so that the head will cut grooves that are as deep at one side as the other. Count the number of file strokes. The saw blades are not set and are filed with the handle held low, giving a sharp bevel to front and back, 40° and 20°. The fronts slope back at an angle of 20° with the radius. File the tops of the chippers, keeping them 1/64" short.

Crosscut. Shops with much crosscutting work find a crosscut saw desirable. It is filed essentially like the cutoff teeth of the novelty saw, but the gullets are deeper, with the angle between teeth about 50°. Bevel 10° front and back for hardwoods, 25° front and 15° back for soft woods.

A scale-model Jaguar that runs on electricity is next month's project for modelmakers.

8. Novelty blade. Teeth of this kind of blade are set; those of a hollow-ground blade are not. They are filed alike. A cant saw file is best, but a taper or blunt file will do. File the front of a tooth and then the back, following your template to keep the proper tooth shape.



Radiator Cover Hides Handy Clothes Drier

Bad weather needn't affect your wife's washday schedule. This indoor drier costs little to build and nothing to operate.



Clothes dry fast and clean and their moisture helps to freshen and minidify the air in the room. The drier holds a lot of wash.

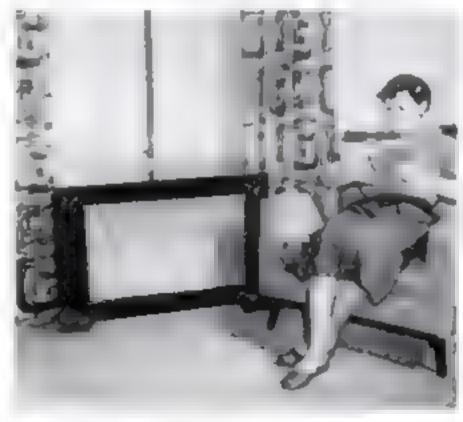
YOU can have this clothes drier without straining your budget. It's a good-looking radiator cover that conceals the plumbing in your living room and also gives your wife a place to quick-dry small laundry for six or seven months of the year.

It consists of an inner frame on which a clothes rack slides up and down, and an outer cover that encloses the frame. The unit shown was made to go under the lip of a window sill. If this should bring yours too close to the top of the radiator, you could make it flush with the sill.

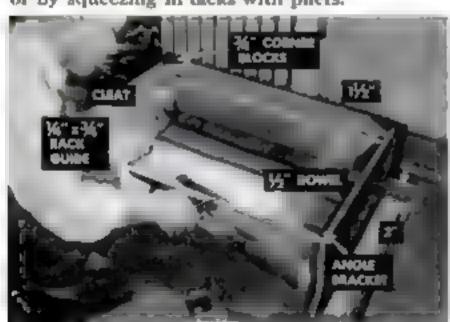
Build the frame to enclose the radiator, including the valves, with a 2" margin all around. Make the cover at least 1" higher and wide enough to fit easily around the overhanging top of the frame.

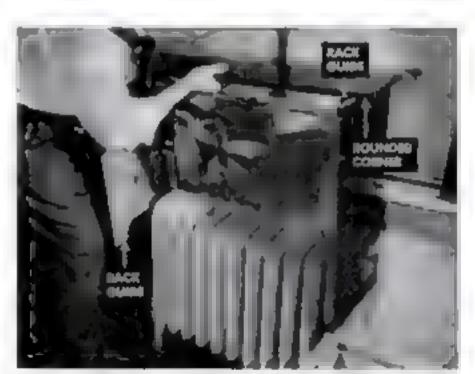
In the front of the cover, cut an opening

Laundry is hidden too. Only difference in the appearance of radiator cover is that it extends out a few more inches when clothes are in.



Open frame, 2" higher and longer than the radiator, has a top 3" nurrower than the sides, but overhanging them 1%". Secure dowel crosspieces with one wood screw in each end. Attach reflector paper to lower dowel with staples or by squeezing in tacks with phers.





Place frame over radiator, pulling pipeless end away from wall if necessary. Secure to baseboard with angle (arrow). Tack upper end of reflector paper to underside of the top.

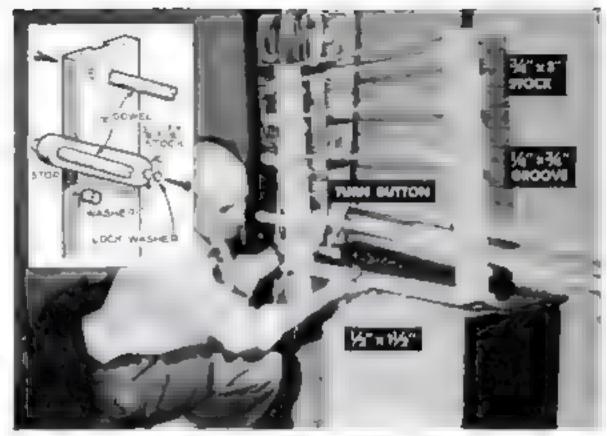
to leave a 3"-wide frame at the top and sides, and 6" at the bottom. Then cut a 3"high notch up from the bottom as a cold-air inlet. Cover the big opening with decorative screening or perforated metal, and frame it with %" quarter-round molding.

The rack rails are %" dowels through pivoted wooden arms. The rails must be staggered so that clothes on top won't cover those lower down. This is done by making each pair of arms 1" longer than the pair next above it.

As a cover tends to reduce heating efficiency, it's well to add a reflective backing to direct heat outward. You can buy reflector paper made just

for the purpose or else use aluminum cooking foil.

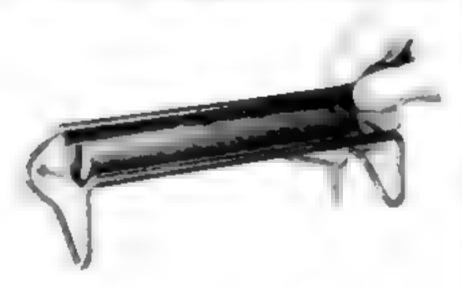
Tack reflector to back of the frame, and then slide the frame behind the radiator and fasten it to the baseboard with angle



Rack has genoved sides to shde on guides, with a dowel crosspiece at the top and a flat one below. Shellae sliding parts to keep them from absorbing moisture, and was well. Turn buttons on top of the frame swing under pivot arms of lowest rail to hold rack up, making it easier to hang clothes.

brackets. Fit the clothes rack into the rails, and push the front cover over everything. The unit will add to the appearance of your room even while it's making itself useful drying the wash.

Soldering Equipment Hangs Up



You can make your soldering-iron stand do double duty. Mount it on the wall with screw hooks, as shown, and it'll serve as a rack for iron and equipment. Make sure the iron is cool before placing it in the rack. The stand is easily lifted from the hooks.

whenever you have soldering to do.-John J. Rea, Urbana, Ill.

My Most Ingenious Solution



After I had tramped around to several stores trying in vain to buy replacement knobs for radiator valves, I hit on a very good substitute. What did I use?

Ordinary rubber coasters—the kind that are used under the legs of furniture. After I removed the broken wooden knobs, I drilled small holes in the center of the coasters. The machine screws that held the wooden knobs now hold the coasters in place on the values.—Neal Flanagan, Brooklyn.

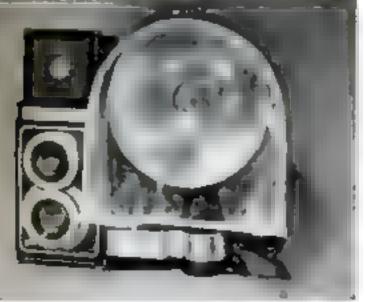


Some of the best picture-taking situations happen indoors—right inside your family circle! The Kodak lighting equipment shown on this page will help you capture those shots whenever you want. Maybe it's an informal one of "Sis" in her first evening dress. FLOODS are the answer, of course. Or maybe it's baby playing in his bath. What

easier way to catch all the fun than with FLASH!

Practically every camera, new or old, can be adapted to indoor picture taking. Your Kodak dealer will be glad to show you all the latest equipment. Make it a point to see him soon.

FLASH helps catch those wonderful candids



Koduk Flusholder, Model B—fits most cameras with flash shutters. 2-way Flashguard offers protection in case lamp shatters... produces soft illumination for indoor color shots. Price, complete, \$12.35.



Kodak Flasholder Extension Unit, Model 8—connects to Flasholder on camera, gives you multi-unit illumination for more naturallooking flash pictures. Attach to flat or tubular surface. \$13.65.

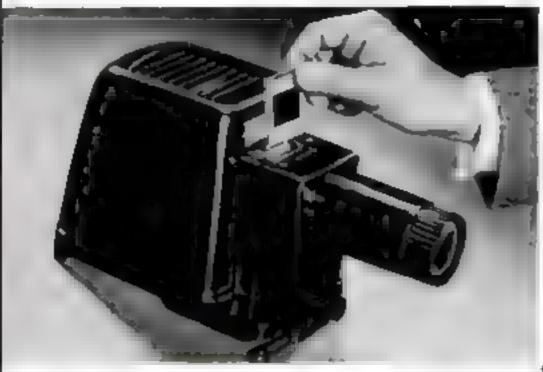


Kodok B-C Floshpock—dependable "flash." Use in place of two "C" batteries in flash unit. 22½-volt battery in Flashpack charges condenser for abundant energy to ignite lamp. \$2.95 (without battery).

COLOT... one of the biggest thrills of all



The beautiful projected image in full color is one of the most satisfying rewards of taking pictures with Kodachrome Film. Here you see some of the latest Kodak equipment and accessories for projecting, viewing, and storing Kodachrome slides. Your dealer's experience and advice can prove invaluable. Don't hesitate to ask him questions. Answering them is his business. Enjoy one of the biggest thrills of all in photography—pictures in color! See your Kodak dealer today.



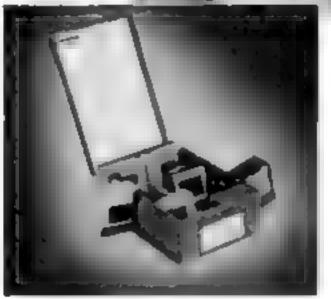
Merit Projector is big news because of its new, improved slide-feeding mechanism. You simply insert slides in top of projector—thus no jarring or moving of instrument. Cool, large-sized lamphouse of unique design to keep slides flat . . . built-in elevating mechanism . . . Lumenized Kodak Projection Ektanon Lens, 5-inch f/3.5 . . . powerful 150-watt lamp . . . all add up to real value for only \$24.50.

For convenient showlegs to small groups— Kodashde Table Viewer, 4X, combines projector and screen in one unit. Think of the convenience—a complete show right in front of you—no rearranging of furniture, no dimming of lights. Switch it on and you're ready for a color show. You see your color slides beautifully enlarged more than 4 times. \$49.50. Accessory carrying case at a small extra charge.





Keep slides protected, organized Kodaslide File Box is a sturdy metal box that holds 150 cardboard slides or 55 glass slides. Separators for group filing. \$1.50.



Prices subject to change without notice and include Federal Tax where applicable. Consult your dealer.

in the de luxe Kodashde Compartment File hold 240 cardboard or 96 glass slides. You'll like the handy index inside the cover for listing slides by subject. \$3.75.





Stove (tin cup) and chimney (tin can) have ventilating holes punched in them. Arm bolts on chimney let it rest on sides of stovi. For greater heat output, two wicks can be used



You'az not likely to spill the fuel out of this stove when you take it camping—it burns paraffin, a solid except when burning

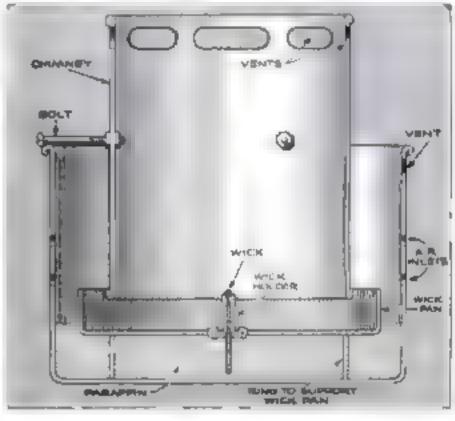
Made mostly from a large tin cup and a tin can open at both ends, the stove is easy to build. Details are shown in the photos and drawing.

The wick pan is a coffee-can lid to which the wick holder can be soldered or attached by tabs that are clinched in slits. Use a piece of folded asbestos paper for a wick. It should extend below the holder, almost to the bottom of the fuel reservoir. When the stove is cold, light it upside down.—Walter E. Burton, Akron.



Squares Measure Big Pipe

It's sometimes necessary to measure pipe that's too large for average calipers and that's installed so it can't be measured across the end. The problem can be solved by using a small carpenter's square and a combination square. Used as shown, the two squares give an o.d. measurement accurate enough for most purposes.—Will Thomas, Buffalo.



Peach Basket Dries Brushes

To DRAIN and dry my paint brushes after I clean them. I just poke the handles through the gaps in a peach basket. It works fine.—H. Graeter, Blairstown, N. J.



Joining Separated Mercury

IF A thermometer is severely jarred or jolted, the mercury column sometimes separates, affecting the temperature readings.

The column can be joined again by cooling the thermometer with dry ice until the mercury has contracted into the bulb. Apply the dry ice slowly at intervals to prevent the mercury from freezing in the tube before reaching the bulb. Now allow the thermometer to warm slowly in a vertical position so that no gas is trapped in the bulb as the mercury expands.

The inside story of your batterySee how it works!

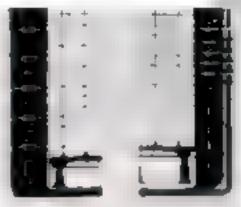
In ordinary bottories, small particles keep flaking off pasitive plates, so ordinary design bottories must have large sediment walls at bottom of case to hold these particles.



2 If rediment wells in ordinary design batteries oren't big enough to hold flaking particles from positive cells, particles pile up and short circuit cells, causing cell failure.

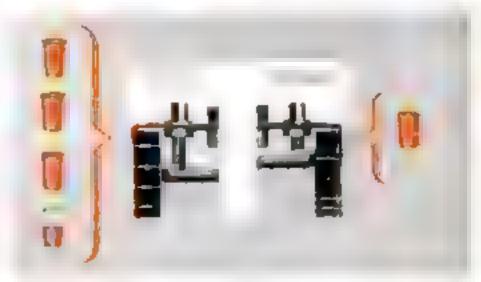


3 In the Auto-Lite "Staful" Battery, every positive plate has a Fibreglass retaining mat protecting it and holding the active materials in place to reduce shedding and flaking.



STATEL OFFICIANT

4 Side-by-side view shows that the "Sta-ful" Battery doesn't need all the extra space at bottom as ordinary design batteries do. So extra space in "Sta-ful" Battery is moved to top where



5... extra space can be used to hold more battery electrolyte, giving room for over 3 times the liquid reserve in the "Sta-ful" as in ardinary batteries. That's why the "Sta-ful" needs water only 3 times a year in normal car use. "Sta-ful" Batteries give longer life, too, in tests conducted according to minimum life cycle standards.

AUTO-LITE BATTERY CORPORATION

Tolodo T

Ohle

Auto-lite sta-ful ...needs water only 3 times a year

EN NORMAL CAR USE

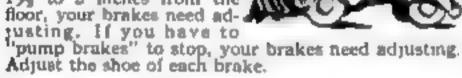


Care and Feeding of Engines

WHEN BRAKES DON'T BRAKE

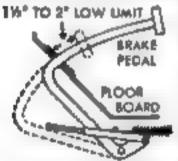
You're rolling merrily along. There's a stop sign ahead, for a main highway. You put your foot on the brakes. Nothing happens. For a few sickening seconds you go along with your heart in your mouth. You pray there isn't a car coming. There isn't. But there might just as well have been

To keep this from happening, check your brakes often. Watch the position of the brake pedal when you stop quickly. If the under side of the pedal is less than 11/4 to 2 inches from the floor, your brakes need adjusting. If you have to



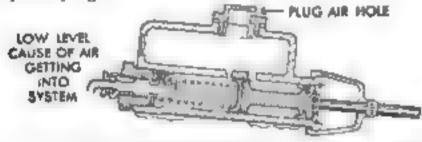
AIR IN SYSTEM

Even after brakes are adjusted, you may have stopping trouble. If the pedal feels spongy or soft as you step on it, you probably have air in the hydraulic system. Check for air in the system by applying the brake.



with the car stopped. Hold the pedal down for a few seconds, then apply a little more pressure. If it moves down again, or feels spongy, you have air in the system, which must be removed by a bleeding operation at any good service station. Air gets in when brake fluid gets too low in the master cylinder. Check this level

often, by cleaning top of cylinder and removing plug. If fluid is lower than 1/2 inch below top of cylinder, add fluid. See that air hole in plug is clean, then replace plug.



IF YOUR CAR SMOKES TOO MUCH



A smoking exhaust means your engine is wasting gas and oil, and needs new Sealed Power Piston Rings. The Sealed Power MD-50 is the best steel oil ring ever made. It controls oil even in badly tapered and out-of-round bores. Your dealer has Sealed Power Rings or can get them for you, A postal to Sealed Power, Dept H-10, Muskegon, Mich, will bring you free helpful book, "7 Ways to Save Oil."

He Turned a Hobby into Big Business [Continued from page 133]

In July 1934, Leo and Carrie moved into the building at Fifth Avenue and 42nd St. where Zeiss had their U.S. headquarters. By this time Leo's brother Si had joined the organization. Extra care was still the secret of the Pavelles' growing success—the only one, really—but the discriminating camera shops in the greater New York area were beginning to know about it. Several of the largest began sending all their fine work to 16 East 42nd St. (where Pavelle Laboratories, Inc., still are located).

Tint Trade-Marks His Work

Leo had always tinkered with the enlargers, redesigning and rebuilding them in his own machine shop—installing high-intensity quartz mercury lights to obtain 20- to 30-diameter enlargements in a matter of seconds, adding devices for removing dust from films, experimenting with new light sources. Also, to protect himself against occasional accusations of poor work that he had not done, he introduced into the fixing bath a blue-green dye about the hue of his serious eyes. This faint tint became his trade-mark, and still distinguishes his work.

World War II brought the Pavelles a new kind of problem. The United States government suddenly wanted 8 by 10 prints on the order of 15,000 to 20,000 a day. For example, the hush-hush Office of Strategic Services had an exacting job: it had requested citizens of the U.S., its allies and friendly neutrals to send in personal snapshots taken in any of the European, African or Asiatic areas where OSS was or expected to be operating—and many of these had to be copied and retouched to make them at all useful.

How to Make Good Enlargements Fast

The problem became one of fast quantity production with uniform high quality. Pavelle shut himself in his machine shop and came up with photoelectric cells to time the exposures for uniform results, and controls that determined exposure, relative accent on subject and background, and other variables. That development eventually led to exposure on 250-foot rolls of sensitized material and the first continuous black-and-white equipment that carried the exposed rolls on tandem, friction-braked rollers through the various baths and washes to the

[Continued on page 246]



AC BPARK PLUG DIVISION

GENERAL MOTORS CORPORATION



Often imitated, never equaled, Starrett Micrometers are the standard by which all others are judged. Precision made throughout by Starrett methods based on over 70 years of micrometer manufacturing know-how... plus 12 big features for better, faster precision measuring. Ask your distributor to show you these finest micrometers ever to carry the Starrett name.

* No-glare, rest resisting Saria Chrome Flaich is standard on thimble and sleeve of all Starrett micrometers and also an frame of all full finish micrometers.



SATIN CHROME MICROMETER NO. 230 Runge 0-1" by .001". Also evallable as No. 231 reeding by .0001".



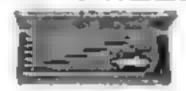
BLACK FRAME MICROMETER NO. 436 24 sixes from 1 to 24". Available singly or in sets with .001" or .0001" graduations.



INTERCHANGUABLE ANVIL MICROMETERS NO. 224

Runges 0-4, 2-4, 6-9, 6-12, 7-12, 12-16, 14-20 and 20-24 by .001". Singly or in sets.





SATIN CHROME INSIDE MICROMETERS

With herdened and ground contact surfaces.
Capacities up to 32",

NO. 823 with tubular rads. NO. 124 with solid rods.

SEND FOR IT — ONLY 104 Sterrett "Tools and Rules" Book

50 page backlet shows the right tools for any precision measuring job, 100 meteres plus helpful reference tubles. Send only one dime. Address Dopt. PS



THE L. S. STARRETT COMPANY-ATHOL, MASS., U.S.A.



BUY THROUGH YOUR DISTRIBUTOR MACHANICY MAIN MARAGINION TOOLS AND PRICESON INSTRUMENTS BILL INDICATORS STILL TANKS PRICESONS APOUND NAME STOCK MACHANIS, GAINS SAME SAME SAME REPORTS

He Turned a Hobby Into Big Business [Continued from page 244]

cutting table. By 1943, assembly-line blackand-white photofinishing of hand-finished quality was an accomplished fact.

But events never give Leo Pavelle very lengthy breathers. In March 1944, Ansco introduced Printon, a sensitized material on which positive-transparency color film could be printed. Pavelle spent a week in Binghamton, N. Y., poking his opportunity-conscious Roman nose into every detail of the Ansco plant. He came back fully persuaded that Pavelle's brightest future was in color. But it was easier said than done, for the momentous step involved, among other things, new machines and new capital.

New Goal : 20,000 Color Prints a Day

The machines represented the greatest challenge Pavelle the engineer had ever taken on. Again, he disappeared in his machine shop. He knew that he would require two basic devices; one, a printing machine adapted to printing color transparencies by projection on long rolls of Ansco color Printon (exposures to be critical and automatically controlled, and the light source kept constant in color quality); another, a color-processing machine to carry the Printon through developing tanks, washers, driers, etc., under rigidly controlled conditions.

One year later, Pavelle Color, Inc., started producing in its huge \$600,000 plant near the Hudson River on West 57th St. Into it had gone all of the Pavelles' money. But today, 175 employees (100 more probably will be added by the end of 1951) turn out as many as 20,000 color prints a day, exposing them on the new 1,000-an-hour capacity machines that feature, in addition to the photoelectric regulators and handoperated knobs, yellow, cyan and magenta filter-wheels that offer 2,000 different combinations selected by an automatic color analyzer. Processing is done in a 120-foot room-at a temperature of 72° maintained by a special air-conditioning system that allows but one-tenth of a degree tolerance.

New Color-Negative Process Next

Teamed with Ansco, the man who makes shutterbug beginners look like pros is currently shooting for a fat share of the nation's color-picture printing. Ahead lies Plenacolor—Ansco's negative-transparency answer to [Continued on page 250]

PET

The POPULAR Line of Portable Power Tools

For Better Work... Easier and Quicker

Have Hundreds of Uses Around the Home In the Shop • On the Form

Embodied in every PET portable electric tool and accessory is the excellence and value developed through advanced engineering, modern streamline design, economical manufacturing methods, and the specialization in high-quality electric tools. Each represents the finest precision workmanship and quanty features that contribute to dependable performance, trouble-free service, and a new balance and ease in tool handling. The various accessories available for use with PET portable electric tools have been tested and proved in the applications recommended. They conveniently extend the use of this portable power to a variety of jobs that make for easier and better work around the home, in the shop, and on the farm.

You can buy a PET portable electric tool from your dealer with the full confidence of getting the ultimate in the combination of economy, power, light weight, belonce, operating convenience, and long life of trouble-free service. Use coupon for complete details.

ZEPHYR

1/4" Drill

Full 1/4"
Capacity
Lock-Type
Trigger Switch
Palm Grip
Price \$17.95



TEPHYR

1/2" Drill

Streamline Design Removable Side Handle,





Spraymaster Portable Spray Outfit

For Paint, Lacquer, Enamels, Mothproofing Solutions, Etc. Price \$24.95



HI-POWER Bench Grinder

4" Diameter Wheels, 3500 RPM. Price \$18.93



At Hardware, Implement, and Building Materials Dealers, and Department Stores —Or Write Direct

PORTABLE ELECTRIC TOOLS, INC.

326 West 83rd St., Chicago 20, IK.

In Canada: Portable Electric Tools, Ltd., 369 Danforth Road, Toronto 13, Ontario,



Maximum Depth of Cut 21/4". Adjustable for Depth and Angle of Cut, Price \$41.95

Portable Electric Tools, Inc.

326 West 83rd Street, Chicago 20, Illinois

Please send me your new PET tool catalog and name of nearest dealer.

Address .

City Zone State

Seed Coupon Today for Full Information



I built my own TV set. Seventeen-inch tube. Assembled chassis. Birch veneer cabinet. Modern design. The cabinet materials cost me \$34.50. I figure I saved over \$100. And I had the fun of doing it myself. What's more, it's just what I want in size, design and finish.

"On this job alone, Shopsmith saved half its own cost. I used it for everything—sawing, sanding, drilling and turning. It took me less than 60 seconds to change from tool to tool, In fact, I saved hours on jigs and adjustments, thanks to Shopsmith's time-saving features and precision settings.

"For accuracy, capacity, flexibility and allaround usefulness, you can't beat Shopsmith. It's a man-size tool, weighs over 200 pounds. Let me show you just a few of the things you can do with it."

SHOPSMITH is a complete power workshop . . .

- 8" circular saw 12" disc sander
- * 33" wood lette * 15" drill press
 - Horizontal skill

Five-tool unit complete accept for motor*..\$189.50

*Special Vs-Ap., capacitor-type motor \$34.50



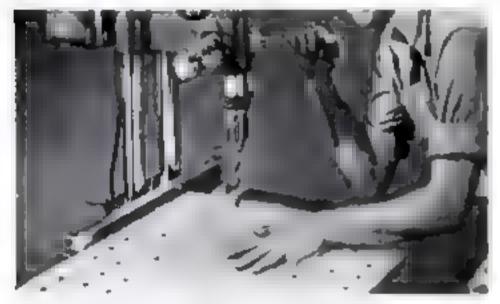
SEE SHOPSMITH DEMONSTRATED AT LEADING HARDWARE AND DEPARTMENT STORES OR ANY MONTGOMERY WARD STORE. WRITE FOR FREE CATALOG.



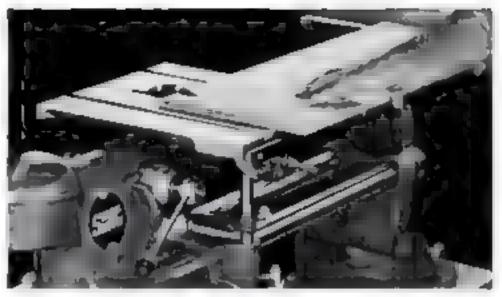
"Sawing large panels. Shorsmith has the capacity of a production-type saw. By putting the rip fence on the table extension, you get a maximum blade-to-fence distance of 48"—or right to the center of a standard size plywood panel."



3 "Duplicate sanding is still another exclusive SHOPSMITH feature. You set up SHOPSMITH as a disc sander using fence and miter gauge as ready-made jigs. Set depth stop-nuts and feed disc into work. Pieces come out exactly the same length with precision-sanded ends."



5 "Farallel drilling is another operation that's a cinch with Shopsmith. Rip fence serves as instant-set guide. Large table supports big work-pieces. Vertical drill press features 4" quill feed, 4 ball bearings in headstock, extra-big capacity."



2 "Accurate cuts are easy with Shopsmith.

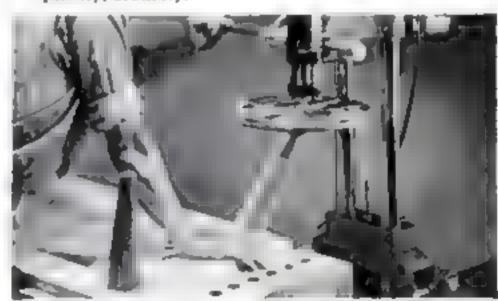
Large miter gauge has automatic spring stops.

Self-aligning fence has rugged front and back

locks. For quick, accurate fence settings, the microquill adjustment makes hairline adjustments easy."



4 "It's a lathe, too! Yes, Shorsmith is a heavy-duty wood lathe with 15" swing and 33" between centers. In turning pieces like the legs for my TV cabinet, the Shorsmith tool rest certainly proves its worth. Always slides parallel to work, and locks quickly, securely."



6 "Another SHOPSMITH extra. To level legs of cabinet, I swung Shopsmith to vertical position, attached sanding disc and set depth stop-nuts. With workpiece upside down, I fed disc into each leg until it stopped. All legs were identical in length."

FREE! 16-page information-packed catalog. Gives full details and specifications on Shorsmith and accessories. Write for it.

MAGNA	ENGINEERING	CORPORATION,	Dept 177-A, at	factory	negrest you
12819 Ca	it Rd., Clevelar	ed 6, Obio, OR Mc	rais Park, Californ	ile	

Name		
Address		
City	State	



make your HANDS MORE CREATIVE with x-acto Knives and Tools

Creative hands can be your greatest asset ... X-acts knives and tools help the intelligent coordination of active minds and agile fingers... they can develop skill and desterly in any art or handlcraft you select.



Whether it's boat whitting, model airplanes, wood-carving, leathercraft, model railroads or any other handicraft, you can make your hands more creative with "designed-for-the-job" pracision-engineered X-acto knives, tools and handicraft kits.



X-acts offers the complete line of handicraft knives, interchangeable blades, tools and attractive kits.



From 25¢ to \$30.—at dealers everywhere.







Soud 15^d to corne poologe for our new illustrated. 28-page Entolog.



X-acte Crescent Products Co., Inc. 440 Fairth Avenue, New York 16, New York

He Turned a Hobby Into Big Business [Continued from page 246]

Kodacolor—and Pavelle is going along for more than the ride. Recently released in test areas, and due for public distribution by 1952, Plenacolor is expected to claim its hunk of a traffic that may well approach 100,000,000 color snapshots a year before 1954.

If Leo Pavelle has any business worries he does not take them home to sons Arthur, 17, and Richard, 10. Neither does wife-partner-mother Carrie, whose black-and-white business employs 70 and is like-wise about to add help.

"Mostly, I'm turning out gunstocks, or making fishing rods, or maybe tying flies or taking cameras apart—when I'm home," he says, the blue-green "trade-mark" eyes lighting up at the thought.

Just en Occasional Ride-at 120 M.P.H.

"He's a nut on sports-ear racing too," an admiring assistant adds.

"Oh, I'm just a guy who likes an occasional ride in a fast job like the Jaguar," Pavelle says modestly.

"Yeah—at 120 miles an hour," the assistant mutters

Anything else?

"Well, I'm going to teach a little next year. New course in photographic technology in the Graphics Division of the Engineering Department at Columbia. I'll handle the engineering aspects"

Wasn't he afraid of truning too many

rivals^a

"Lord, no! We're interested in building the industry, not ourselves. We'll get our share." END

Baby Rattle Fit for a King

PROBABLY the world's most expensive rattle was the aluminum one bought for the son of Napoleon III. Its price in 1856, when aluminum was considered a precious metal, was \$3,200.

Sea Sound in Shell a Phony

The sound of the "roaring sea" we hear when holding a sea shell to the ear is caused by resonance. The partly enclosed air within the shell is made to vibrate by a harmonious, or matching, frequency of sound in the outside air. In a soundproof room, a sea shell would produce no noise.



Can Makes Welding Shield

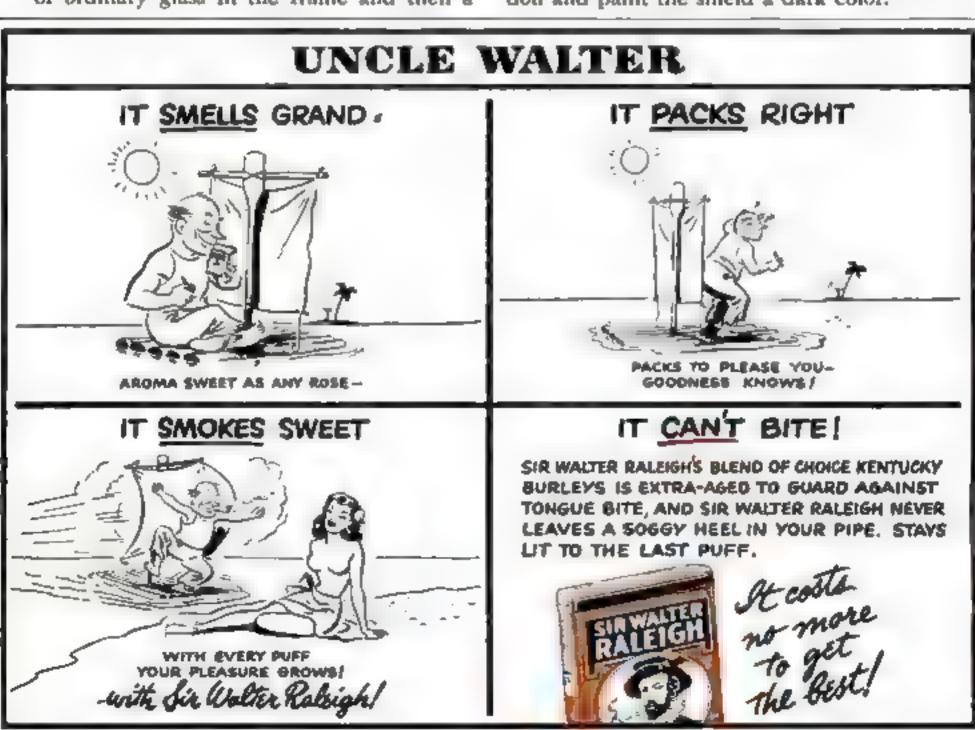
A sturdy and efficient welding shield can be made from an empty gallon can. Remove one side of the can, making the cut just a little beyond the seam so that the seam is retained to reinforce the edge, Fold over the cut edges and squeeze down tightly.

Cut a 1%" hole in one end of the can. Roll up a 6" length of the waste tin for a handle and solder the seam. Flatten and bend down one end. Push the round end through the hole from inside the can and solder tight where it enters the can and where the bent end meets the inside of the shield. Solder the screw cap to the end of the handle.

A smaller rectangular can, cut off %" above the bottom seam, forms the glass frame. Cut out some of the bottom to make an opening for the glass. Cut a hole of the same dimensions as the frame in the face of the shield, 3" down from the top. Shit the four corners of the small can and put it through the shield. Hammer the edges over, inside the shield, and solder all around. Insert a piece of ordinary glass in the frame and then a



piece of welder's dark glass. Cut the glass retainer from the remaining waste tin, bend up the two tabs, and fasten them over the dark glass with 8-32 screws and the knurled nuts from a dry cell. Be sure there are no light leaks around the retainer. Wash off any soldering acid with washing-soda solution and paint the shield a dark color.



all the precision of industrial machine tools in your own home shop

DELTA 8-INCH TILTING ARBOR SAW-Table Model

Home shop work is a real joy when things come out according to plan... when cuts are true... joints fit snugly into place ... drawers slide smoothly... all without the exasperating nuisance of refitting.

Of course, it takes precision machines to turn out accurate work. That's why smart folks buy Delta Homecraft Tools. For remember, Delta has spent years building the finest precision machine tools for industrial use. And the same accuracy and hairline precision that is required for these Delta-Milwaukee Tools is built into the Homecraft Tools you buy. We just don't know how to build them any other way.

So... buy the best... buy Delta... have machine tool precision and lifetime service in your own home workshop.

There's a Detta Power Tool for your Job-

WOOD OR METAL WORKING

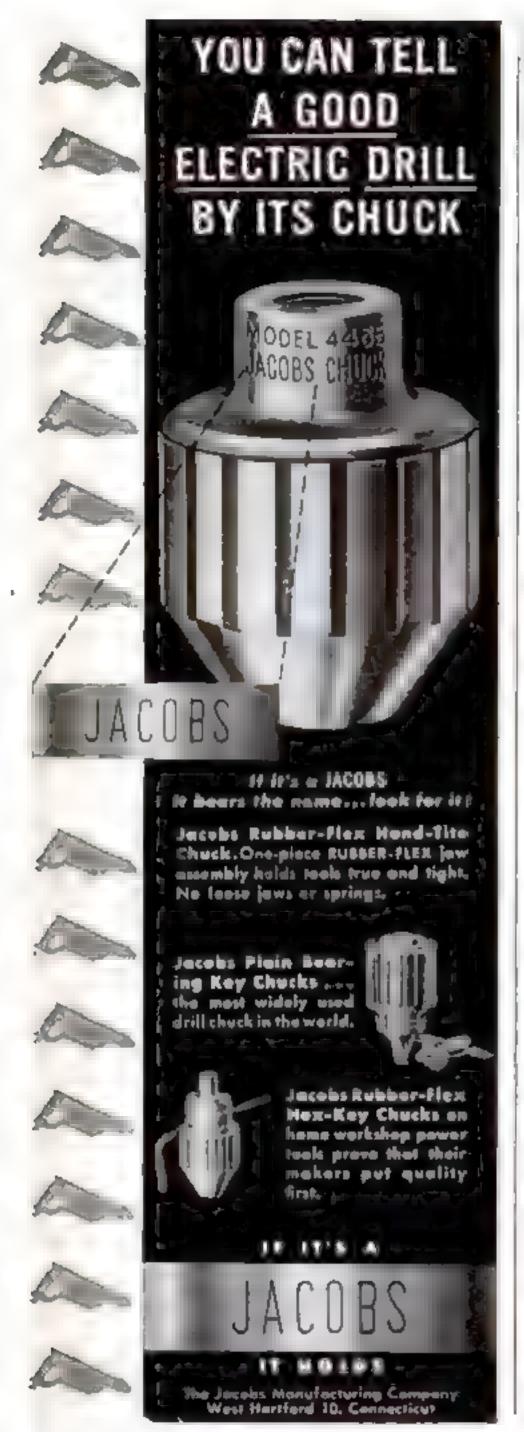
53 MACHINES—246 MODELS—MORE THAN 1300 ACCESSORIES
For Date Dealers, see your Clamitted Phone Directory under "Tools".

These Delta 8" Tilting-Arbor Saw Features Insure Accuracy and Precision

- Lubricated-for-life ball bearings keep dist out, lubricant in
- 2. Precision-bared bearing seats—fit close, cannot become loose
- 3. Fre-loaded bearings eliminate arbor end-
- Precision-ground orbor—assures even-contact between arbor and bearings, means greater accuracy
- 5. Dynamically balanced pulleys—prevent wearproducing vibration

These excellent features, typical of Delta precision quality, are fully described in the new Delta Homecraft Catalog—packed full of valuable information and suggestions on how to get the utmost of fun and satisfaction out of your home workshop and your Delta Homecraft Tools. Send for your copy—it's free. Use the coupon.

DELTA	DELTA POWER TOOL DIVISION
MILWAUKE	Rockwell
(i	MANUFACTURING COMPANY
BOSLEV	IBNNA AVENUE - MILWAUKEE I, WIS,
4	me the new Delta Homecraft Catalog.
Name	
Address	Zone State



Gus and the Missing Straddle Truck [Continued from page 198]

Thatch tell you about this straddle truck?"
Gus shook his head.

"Well, between you and me, I don't think there's anything wrong with it," explained Ned. "Runs fine for me, but every time Frank-he's the driver—takes her out for a day in the yard, he brings her back howlin' a blue streak and tellin' me that she's got a bad miss."

"What does he claim it does, start to miss after it's warmed up?" inquired Gus.

Engine Runs Fine

"No, he claims it begins to miss just as soon as he gets to pushing her at all. You know these straddles take a lot of punishment—lots of lugging and lots of idling every day."

"Mind if I have a look at the engine?" asked Gus.

"Help yourself," replied Ned., "I've got other work to do."

So as Gus chimbed up on top of the straddle truck and opened the hood, Ned disappeared into his shop and presently Gus could hear the noisy hiss of an acetylene torch.

Gus's first hunch was fouled plugs caused by so much idling. However, when he took out several of the plugs he found them fairly clean. Replacing the plugs, he climbed around to the driver's seat, turned the ignition switch, and hit the starter button. The engine didn't catch immediately, but when it did it ran smoothly. Although he'd never driven a straddler before, he wheeled it around the space in front of the shop several times. He thought the engine sounded pretty good.

Now Engine Misses

Just at that point, Gus noticed a young man approaching the shop.

"You Mr. Wilson?" he called to Gus. "Mr. Thatch told me to see you. I'm the driver of that truck."

Gus flipped off the ignition, "Understand this animated doodlebug has been giving you trouble," he called down.

"You can say that again. Got a bad miss, but I can't convince this dumb mechanic of ours. Here, I'll show you." He climbed up, closed the hood and slid into the driver's seat. "We'll drive her up to the yard and pick up a few boards."

[Continued on page 256]



TOUGH .. but oh so gentle

TOUGH ON OIL-PUMPING . GENTLE ON CYLINDER WALLS

When your car first starts using too much oil, look out for worn-out piston rings. They cause oil-pumping...loss of power...destructive engine wear.

Fortunately, it's comparatively easy and inexpensive to replace worn-out piston rings—but the more you delay, the more you pay.

Keep your car aut of the DANGER ZOME

Ask your motor service man for a Danger Zone check-up. And write for the free Hastings Danger Zone book-let which shows you how to save money on engine repairs. Dept. P., Hastings Manufacturing Co., Hestings, Michegan, Hastings Ltd., Toronto.



At the first sign of oil-pumping, replace your rings with Hastings piston rings. They're engineered for replacement service. They stop oil-pumping, check cylinder wear, restore engine performance.

It's the best money you can spend on your car.

HASTILLS

STEEL-VENT PISTON RINGS

PISTON RINGS . SPARK PLUGS . OIL FILTERS . CASITE . DROUT

New improved Woodworking calculator

enswers countless questions in seconds...speeds jobs!



Gus and the Missing Straddle Truck [Continued from page 254]

Even without a load, Gus could now detect a loss of power, "Mind if I drive?" he asked when they had reached the yard.

"Sure thing," said Frank

Gus put the truck through its paces. There was no doubt about there being a bad miss every time he pushed hard on the gas.

"See what I mean, Mr. Wilson?" said Frank, "But that grease monkey we've got won't believe me, and he won't take the truck out himself and test it."

Gus Straddles a Straddle

Gus didn't answer. He was too busy trying to work out in his mind just why the engine missed now but hadn't missed before. Sliding out of the driver's seat, he opened the hood again and checked the distributor. the carburetor and the connections to the coil and the spark plugs. Everything checked out.

"Start her up, will you, Frank?" Gus

called from beside the open hood.

Frank complied and again the engine took hold easily and purred along. For the next fifteen minutes, Gus peered under the open hood while Frank maneuvered the big straddle around the mill yard, picking up lumber, backing, idling, and gunning the engine.

Again there wasn't a hint of a miss. She

was hitting on all six.

"Cut it," called Gus, and he just sat there staring at the temperamental engine. Suddenly he reached up and slowly closed the hood. Then he raised it, pulled it down and raised it again.

Ned Loses a Bet

"Humph," he said, digging into his left coverall pocket for his friction tape. Then he proceeded to wrap tape around the bundle of ignition wires that sprouted from the top of the distributor. "All right, now let's try her again.

This time the engine ran smoothly no mat-

ter what Frank did.

"That's got it," said Gus.

"What?" asked Frank.

"Come up here," said Gus. He pointed to a worn shiny spot on the underside of the hood. "The distributor wires were rubbing against the hood when it was closed. Pinprick leaks in the insulation were shorting

[Continued on page 258]



INSTALL MATICO YOURSELF for as little as 13; a sq. ft.



Create exclusive designs from unlimited color combinations!

Beat high flooring costs! Install MATICO yourself! You can floor an entire room in only a few spare-time hours. MATICO affers everything you need—simplified instructions . . . special tool kit . . . and tile so outstanding in color richness, finish and durobility that it is ideal for every room in your home. Superior MATICO resists scuffs and mars . . . washes easily . . . gleoms like new with occasional no-rub waxings . . . wears for years and years . . and comes in 27 rich colors, including lovely pastel "Petal Tones," Colors and marbleization can't wear off — they go clear through each tile. Ask your dealer for details or mail coupon today!

*Your cost may be less, or slightly more, depending on where you live, and the colors you select.



MASTIC TILE CORPORATION OF AMERICA

WORLD'S LARGEST PRODUCER OF ASPRALT TILE

Member Aspholt Tile Institute

Jollet, III . Long Beach, Calif. . Newburgh, N. Y.

For faster cleaning . . . more beautiful asphalt tile floors, always use MA-TI-CO Wax and MA-TI-CO Cleaner.



MASTIC TILE CORP. OF AMERICA Dept. 5710, Box No. 986 Newburgh, N. Y.

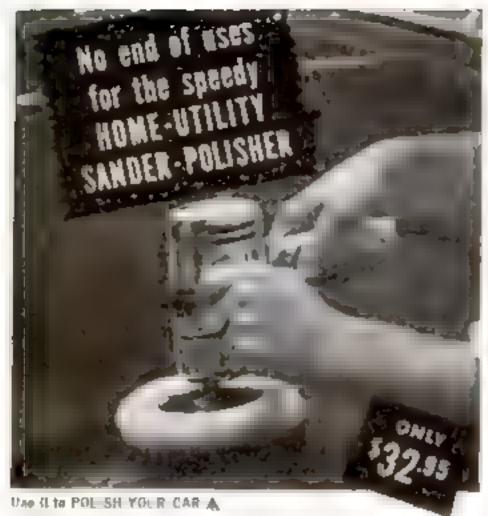
Please send complete install it yourself instruction kit, rated literature and color charts. Enclosed is 10c mailing

NAME

CITY..... ZONE.... STATE.....

Good Housekeeping

O securet will





DOWN FURNITURE!



DRILL LEAD HOLES!



WOOD BORING!



Use II to SHARPEN CUTLERY!



Use H 10 REMOVE RUSTI

This husky, versatile tool drives many attachments to save you time, money and muscle!

You haven't handled a really versatile tool until you've tried the Home-Utility Sander-Polisher! It comes complete with sanding discs, lambswool bonnet, '4" drill chuck, cans of auto polish and wax. It drives many other attachments for grinding, sharpening, buffing, burnishing and cleaning. And it weight only 3½ lbs, so it's easy for the whole family to use!

QUALITY-BUILT BY WORLDFAMOUS BLACK & DECKER, this
Sander-Polisher is a real tool,
not a mere toy! It has an
extra-powerful motor for highspeed work from AC or DC
outlets. Its housing is strong,
light die-cast aluminum. It
has an instant-release trigger
switch. Its balanced design
means comfortable handling.
Try it today at your hardware, electrical or implement
dealer's or department store.

The BLACK & DECKER Mig. Co., Dept. H105, Townen 4, Moryland

BLACK & DECKER



DRILLS . LECTRO-SAWS . BENCH GRINDERS

Gus and the Missing Straddle Truck [Continued from page 256]

out some of the cylinders when the wires touched the metal."

"Ha, wait'll you hear Ned howl when he hears this," said Frank as he wheeled the straddle truck around and headed for the repair ship "This'll burn him"

"Why?" asked Gus

"Ever since he heard von were coming out, he's had a 10-back bet with me that you wouldn't find my mass anymore than be could. Now, he'll have to pay off and he ain't goma like it."

Ned, bowever, paid off without a beef.

"Like found money," said Frank taking the two fives Ned handed him, "Here, Mr Wilson, let me split it with you." he added, thrusting one of the bills into Gus's hand, "After all, you found the trouble,"

Driver Apologises

Gus, slightly flustered, stood holding the bill for a moment, then handed it back. "No. Frank that was your bet, not more."

A few annutes later as Gus started up the steps to the mill office to find Don Thatch, he bumped smack into the pickup driver coming down. He greeted Gus with a pleasant smile as the two passed.

After Gus had told Don about fixing the straddle truck he said. "What's happened to your pickup duver? Met him as I was coming in and he was almost human."

"Oh, I called him in to baw! him out about his attitude," explained. Thatch, "but before I could say much be apologized for being rude to you. Said be'd had a spat with his wife this morning but he'd try to leave his troubles at home after this."

"Well, I'm ready to get back to the Model Garage any time now," said Gus, "Mind if I use your phone?"

Gur's Hunch Pays Off

"Go right ahead," said Thatch, "Use that one over there, it's an outside line. I'll get my car and meet you out front."

Gus gramed as he read the bold, black headlines that streamered across the local paper the next morning:

STATE POLICE NAB ALLEGED BANK ROBBER

And the story went on to say.

... After searching the premises and finding more than \$30,000 in bills stolen from

[Continued on page 260]



MARFAK MADE HIS CAR RIDE SO CUSHIONY HE'S SPOILED



Forget about "rough riding." Get longer lasting Marjak chassis lubrication, and enjoy "cushiony" driving for 1,000 miles or more! Tough, stretchy Marjak is made to resist wash-out, jar-out, squeeze-out. It protects against wear and friction far longer. Get Marjak lubrication today. See your Texaco Dealer, the best friend your car ever had.

THE TEXAS COMPANY TEXACO DEALERS IN ALL 48 STATES

Texaco Products are also distributed in Canada and in Latin America





For special jobs for hobbyists

ATKINS JR. SAWS!



Jr.-65

High speed, "Silver Steel"—straight back.

16" blade Perfection-pattern, apple wood handle. Identical in everything but size with one of the world's most famous saws.

Also evailable as 18" 6-point rip saw.

Keyhole Saw Special rounded end for safety. Fully lacquered plain beech handle. Perfectly tempered, flat-ground blade. Atkins "Silver Steel" quality through and through!



Jr.-2 Back Saw

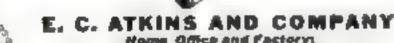
Expertly tempered special steel for longwearing, stay-shorp qualities. Fully lacquered beech handle. Filed and set, ready for duty for dozens of jobs in shop and home.

AND 3 MORE JR. HAND SAWS Jr.-6, Jr.-4 and Jr.-2. Each a perfect rep-

lica of its larger counterpart. Perfect for craftsmen and women with smaller hands. Both the Jr.-4 and Jr.-2 models are available as 18" 6-point rip saws, as well as 16" 11-point crosscuts.

Only ATKINS makes





Home Office and Factory: 402 S. Illinois St., Indianapolis S. Indiana Branch Factory: Partiand, Oregon Knife Factory: Lancaster, M. Y.

THERE'S AN ATKINS FOR EVERY SAWING PURPOSE

760 POPULAR SCIENCE

Gus and the Missing Straddle Truck (Continued from page 258)

the City National Bank four months ago, a State Police raiding party headed by Sergeant Jerry Corcoran from the local barracks cornered Art King, alias Ned Hoffman, in his quarters at the Empire Lumber Mill last night. King, police believe, never spent the hot money himself, but passed it off on others by changing the bills at the mill office and by asking fellow workers to do his shopping. . .

The slam of the garage-office door interrupted Gus's reading. He turned to find Jerry Corcoran and Captain Torrence, commander of the barracks

"Okav, private eye," joked Jerry, "how'd you do it?"

They All Slip Sometime

"Well, even though I'm not married," said Gus, "I guess I've been around enough to spot a bleached blond when I see one. Poor old Ned had been neglecting to touch up the part in his hair. Then I discovered that he sure was no mechanic, but loved to play around with a torch. The tip-off came when he settled a bet with one of the other mill hands. Just by luck, I got a look at one of the bills and the serial number matched the list. That plus the fact that he hadn't worked at the mill long and lived by himself over his shop seemed to add up to a fair hunch. That's when I called you, Jerry."

"Gus," said Captain Torrence, "during the 25 years von've been running this garage von've been a tremendous help to us many times and we'd like you to know how much we appreciate it." Torrence straightened, and a note of formabty came into his voice "We of the State Police hope you'll accept this slight token."

Gus opened the small brown leather wallet the captain handed him. Pinned inside was a gold badge with the shield of our state and inscribed: "Honorary Captain—State Police."

Next months Gus Gives the Air-Eores a Lift

What Brought About the Ice Ages?

Among the theories propounded by geologists for the existence of the ice ages are: changes uside the sun that reduced the amount of heat radiated; upheaval of land masses, causing abnormally large snowfalls; passage of the solar system through gigantic cosmic dust clouds that reduced the heat received from the sun; and a shift in the earth's rotational axis.



CHANNELLOCK PLIERS

Made only by CHAMPION DEARMENT!

No matter what the job—plumbing, electrical, automotive or whatever, Channel-lock pliers are handy to have around. The patented Channellock principle permits a wide range of size adjustments without decreasing gripping power or leverage.

Channellock pliers are made by Champion DeArment-for nearly 3/4 of a

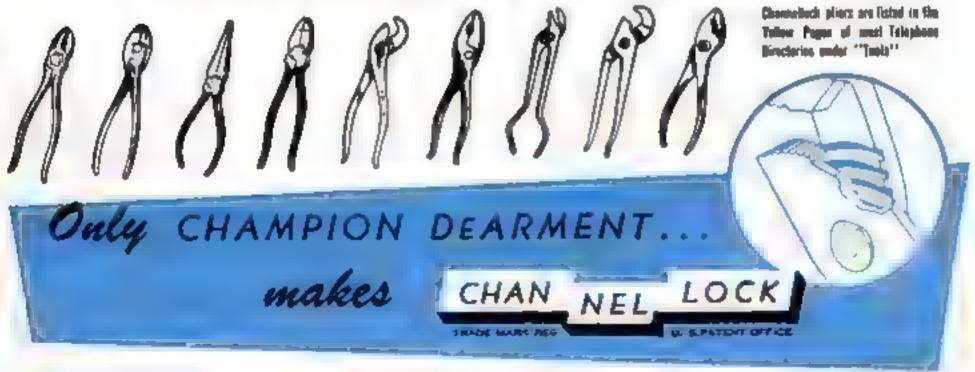
century manufacturers of highest quality tools.

Dad, Mom, or the kids will find plenty of uses for Channellock pliers.

And remember—Only Champion DeArment makes Channellock.

Send for Catalog today.

CHAMPION DEARMENT TOOL CO. . Meadville, Pa.





Makes loose joints firm, sands to a

smooth finish!



Reset loose hinges.

Replaces rotted wood, tightens loose screws . . . easy to apply!

Repairs broken toys

Mend cracks, nicks! Smooth finish!



Also useful in filling cracks in floors, nail and screw holes, repairing loose tiles. Handles like putty . . . hardens into wood!



How to Photograph Your Boss [Continued from page 216]

angle, light, meter, shutter, exposure and the like, you'd better employ what I call the decoy system. Simply unload the task of relaxing vour subject onto someone else. You recruit a good talker, someone the boss likes to listen to, from around the office or plant. Important: don't let the decoy start kidding about the picture taking. That only prolongs the self-conscious period, Instead, brief the decoy in advance, have him primed with serious and interesting topics to take up with the boss. Warn him not to pitch questions; he must do the bigger part of the talking. You want to shoot while the boss is listening, not when his mouth is open answering questions. I once photographed a president of Standard Oil, and made the mistake of asking about his trip to Alaska. His type of camera shyness took the form of answering my question for an hour.

Include Hands and Body

Before the decoy goes into action, I suggest you drag the boss's chair out from behind the desk. You're there to photograph the man, not the walnut. Face the chair toward the decoy slightly sideways to the camera (a head-on or broadside is harder to make interesting). Make sure there's no lamp, shiny wood paneling or patterned material behind to distract. Since almost the toughest assignment is to make a standard head-and-shoulders shot interesting, stay back far enough to include hands and body positions. That way you can hope for more variety when the boss gets to talking.

Don't try to pose your subject; make him pose himself. If he's accustomed to smoking, let him. If he wants to put his hands in his pockets, let him. He'll feel more comfortable—and you'll get a better picture. But don't try to make a smoker out of a non-smoker just for the sake of an interesting picture, or hide a pair of particularly expressive hands just to get them out of the way. Let him do in front of the camera exactly what he would do behind its back, and you'll be sure of a pose that's neither stylized nor unnatural.

Lighting should be simple. Complications in lighting are all right if you know what you're doing and can clamp your subject in a vise. But tricky lighting—shooting in from the side and top—can rum you if your subject's head moves away from its

[Continued on page 264]

"New-Engine" Your Car Now For As Little As \$16 Down



*Your easy, low-cost solution for "tired" Chevrolets, Fords, Plymouths, Pontiacs, Dodges, and other popular makes. Wizard-ized Engines are fully remanufactured in 5 large factories (not just shops or garages). Engine accessories are used from old engine, or may be replaced new.

Get Another 50,000 Miles or More from Your Car With a WIZARD-IZED ENGINE That Pays for Itself!

Thousands have discovered this easy new way to end costly it repair bills—aimply by replacing their old engines with lowcost Western Auto Wizard-ized Engines . . .

No other engine—ne everhout job—can give you more powerpacked miles at so little cost! And, you get . . .

The same engine government that comes with a new cor-plus a free 500-mile service inspection of our installation, Every Wigard-ized Engine gets a

Complete factory inspection and then a final test run. Our installations made by trained mechanics in fully equipped garages. And, this new car power is yours for . . .

Holf the cost of a new engine. You're paying for it in gas, oil, repairs ... , why not enjoy it now? For

Less then 1/2¢ per mile, you get years of new miles without paying the high cost of a new car. Don't wait. . .

See your Western Auto man tomorrow . . . find out about his guaranteed trade-in allowance for your old engine!

Why You Can Have Confidence in a WIZARD-IZED ENGINE!





1 Not just "robulit," hut completely remanufactured - vsing selected original fectory block.

2 Typical BRAND NEW top quality parts in Wigard-Ised Ingines All other parts fully remanufactured.



gverantee hy America's largust group of auto supply steres (ever 3000).



4. bocked by a fifty million deller firm with 25 million custemers, proof of dependobulty!

EASY TERMS AS LOW AS \$ 700 Terms vary by area and make of cor weekly

The Engine You Can Buy with New Car Confidence!





without drudgery or danger



paint, hardware and department stores.

Product of W. M. BARR & CO. 2358 S. Lauderdale • Memphis 2, Tenn.

Buy the Best ... WISS!



WISS Metal Master Compound Action Snips

#M-3. Easily cuts [8 gauge sheet metal. Cuts curves and circles as well as straight. Ideal for the horse workshop. \$4.25. Rubbet grips recommended, 60¢ extra

WISS Straight Cut Snips

#9-Crucible steel inlast blades. The basic snips for straight metal sutting Gun metal handles. Overall length \$252.

WISS Combination Suiss

V-13. Solid steel, with gray japanned handles. Cuts curves and irregular shapes with case Handy pocker size. 7" long Accurately tempered jaws and strong boils. \$1.85



J. WISS & SONS CO. . MEWARK 7, N. J.

How to Photograph Your Boss [Continued from page 262]

original position. Anyway, who wants to make portraits that arouse a "What marvelous lighting" Better the comment: "That's the man, exactly."

With a small camera and a fast lens, you might use the natural light from a window if it looks well on your subject. If the shadows are too dark you can take a tip from the candid cameramen, who often "cheat" a little by adding a little fill light to the shadows with a photoflood bulb heavily diffused. If the available daylight is too dim or from the wrong direction, it will have to be mazda or flash. I advise placing one light to the side next to the decoy. This will throw a shadow on the camera side of your subject's face. A smaller bulb, diffused with tissue paper next to the camera and closevery close-to the lens, will serve as a fill light, preventing the shadow side of the face from coming out too dark.

Flash Hos Advantages

With flash you won't burn up your boss's eyes as you will with mazda, and flash will mean that he won't have to hold still, and you can catch fleeting action and expressions. But with a flash rig fixed to your camera you're sunk—despite the fact that many cameras come this way and most flash outfits are made to clamp onto the camera. Lighting from close to the lens will make your boss's face about as interesting as a newly ironed bedsheet. Get the light off the camera for roundness and texture.

Once you've got the setup right, you can stop acting like a technician. Now you become a picture reporter, a creator, the man with the finger sensitized to react in a split second whenever that beguiling, contemplative, challenging, amused, wonderful expression flits across the boss's face. Click, and you, the recorder, have set down a facet of a man. And that is not such a small thing to have accomplished.

Radio Waves and X Rays Are Close Kin

DUPONT URGES TWO STEPS NOW

... BEFORE COLD WEATHER CAN CRIPPLE YOUR CAR

get your cooling system checked and serviced

When the cooling system quits, your car quits. If your cooling system is clogged with rust and scale, your engine will overheat. If your cooling system isn't tight, you'll lose anti-freeze mixture and risk a freeze-up. So before you put in any enti-freeze, no matter whose, have your cooling system thoroughly gone over. It is well worth the little it costs,



GO to an exposit. The dealer who desplays this emblem offers you a special winter service, Make a date with him early for anti-freeze and for a thorough cooling system check-up before the anti-freeze rush jame his driveway.

2 nd. get a Du Pont Anti-freeze

"ZERONE"

There's no evaporation problem with Du Pont "Zerone"—it's trouble-free needs only an occasional check-up, Use at if you drive at normal altitudes, if your car has a standard thermostat (4 out of 5 cars do), and if you protect to temperatures no colder than thirty degrees below zero.

\$1.50 A GALLON

Q. P. S. RETAIL CEILING PRICE.





BATTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

ZEREX

(trea.e)

"Zerex"* is made by Du Pont to meet these special driving conditions: High-opening thermostats—adjusted to run at 160 degrees. F., or higher, high-altitude driving, and extreme low temperatures. If your driving requires a "permanent"-type anti-freeze, you can't do better than "Zerex."

\$3.75 A GALLON

e. P. P. REYAIL CEILING PRICE

PREG. U. S. PAT OFF.

Plane Trails Are Ice

THE long white smoky trails sometimes seen behind airplanes flying at high altitudes are made of ice crystals. They are formed when moisture-saturated air compressed by the leading edge of the wing moves to the back of the wing and expands, causing a rapid cooling that freezes the water vapor to ice. The effect is especially pronounced behind high-speed jets.

Removing Rust Stains from Ename!

Littier rust stams may be removed from an enameled sink or refrigerator by applying lemon juice or vinegar to the spot. Let it stand a few minutes and then wash away with water. Heavier stams may need a diluted solution of hydrochloric send. As this is corresive, apply with cotton at the end of a stick, and avoid touching unenameled metallic parts.

Musical Note Controls Gyro

A sixtum musical note, traveling almost 1 000 railes, is being used to regulate the speed of sensitive gyroscopes. The note, A above middle C, with a vibration of exactly 400 eyeles per second, is broadcast by the National Bureau of Standards' short-wave station WWV near Washington, D C. It is then picked up by Minnespolis where it checks a tiny electronic fork attached to a gyroscope.

Sanding with a Cotter Pin

NEED a small dram sander for smoothing holes fast? A medium-sized cotter pin and a little strip of abrasive paper will make one. Slip one end of the paper between the legs of the pin and wrap it around clockwise, as seen from the eve end of the pin.



Cement the outer end down. Chuck the shank of the pin in a hand grinder.

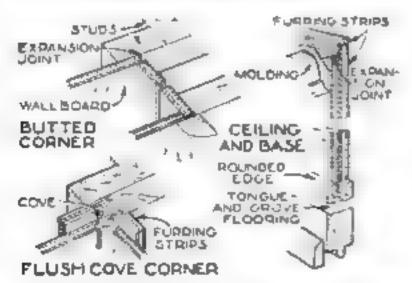
When is Next Eclipse of Sun?

The next total eclipse of the sun visible in the United States will occur on June 30, 1954. It will be seen along a 100-mile-wide strep, starting in Nebraska and moving in a northeasterly direction over South Dakota, Minnesota, Wisconsin and Canada.

Sunshine Discolors Antique Glass

Case antique glass will frequently turn purplish after long exposure to the sun. This is a result of chemical action caused by the ultraviolet rays in the sun's light that changes to manganese oxide in the glass to the permangenate form, which is purple in color. Modern glass, using other chemicals, is not so affected

PLYWOOD CORNERS



When plywood used for interior walls is nafled directly to stude, allowance should be made for movement at the corners. Most simple is the botting of one edge against the face of the adjacent sheet. Expansion space is left at the edge of the sheet butted against. Unless corner study

are unosually strateful, the builting edge will have to be scribed to make a close parit

In better installations where furious strips are natled to the study and the plywood is gined, corners can be made soud with gluca rabia to cove strips, and the like if the cove strips have rabbeted edges to match rabbeted edges of the plywood sheets, they can be natled in to hold the plywood edges while the glue is drying, thus rabbeted cove and plywood suclaces are made thish more easily than plant-edged cover butted against square-edged plywood.

The same kind of corner can be used at the ceiling, or the joint may be an open built covered with a cove monding or a more evaluate corner.

If the plywood is carried to the floor, it will be subject to sculing unless protected by a baseboard. A matched flooring board nailed with the groove up to receive the plywood is easily installed.

FOR YOUR POPULAR SCIENCE INFORMATION FILE



Which lamp is ready to burn out?

NE of the General Electric "All-Glass" headlamps on the test car above has just been lighted for the first time. It's at the beginning of its life. The other G-E lamp... the one on the left... has been burning day and night for many, many months. Yet when the photo was taken it was impossible to see any difference in the light output of these 2 lamps!

That's because General Electric "All-Glass" headlamps give an average of 99% as much light just before burning out as when new. Both the lens and reflector of the G-E head-

lamp are made of hard glass, fused together into one piece. Road and laboratory tests prove that this one-piece unit keeps out the dirt and moisture that might otherwise gradually rob the lamp of light output.

Because they DO NOT GROW DIM, G-E "All-Glass" headlamps mean easier, SAFER night driving. Use them to replace burnouts whenever you need a replacement.

G-E "All-Glass" Headlamps
DO NOT GROW DIM!

You can put your confidence in-





fun or profit! Largest most powerful saw of its kind' QUIET, Ideal for apartments! SAFE b'ade does NOT pull fingers toward it. No belts gears or olling! Adjustable 'any length cut" arm. With BUILT-IN New Resutance Type Electric Mopostpaid

The Name You Can Trust

BEPLACED FREE!

ELECTRIC JIG SAW U S. A. Model No. 201

ry longth materials

60 Cycle, 110-120 Voit AC. Other Voltages, Cycles available. Dealers,

Jobbers -- Write! USE COUPON FOR CIRCULAR OR DIRECT ORDER

STRERG CORP., DEPT. 8-101, GXFORD, MICHIGAN, U.S.A. ORDER, I enclose \$22.95. Send No. 201 Saw postpaid on 10 Day Money Back Guarantee.

FREE CIRCULAR. Send new SYNCRO CIRCULAR showing new SAW and NEW SANDER.

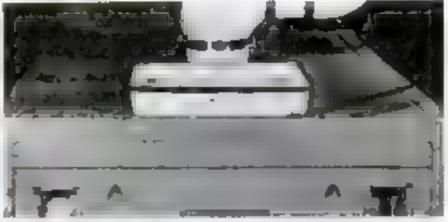
WRITE NAME, ADDRESS BELOW - MAIL TODAY!

Cart Made from Baby Carriage



I DON'T strain my back moving ash barrels and other heavy objects any more, thanks to this utility cart. To make it, 1 simply removed the body and springs from a discarded baby carriage, and then sawed off half the frame that joined the front and rear axles. I find the cart particularly handy for easing barrels up and down stairs.- J. J. Stefanowski, Bayonne, N. J.

Photo Tray Is Humidifier Pan



ENAMELED photographic trays that are too chipped to be used in the darkroom any longer make fine humidifiers for the furnace. R. Hertzberg, Jackson Heights, N. Y.

Hinges from Adhesive Bandages

I save the stiffened gauze or crinoline from adhesive bandages and use it for repairing book bindings or for hinges on projects made from cardboard or other light material. After a hinge is applied with glue, it can be covered with a strip of paper.-Frank Shore, New York City.

FULLY GUARANTEED MEW



GENERATORS D.C.

For welgers grating, truck and marine hitt, D. C. againsters within the destrict quarte - illetime grasse tested half heatings. Heaty

Amps Longard with the world and the first charges of the first carbon at the country of the first carbon at the first carbon a

has the First Dears berny and West nghous 12 50

thin ago He nin Gert tog Cost fine 10 5 mg we 50 lbs 35.00



Vickers HYDRAULIC PUMP

Person Type bank for the with hydren or An hera 99.89 feet tar in a nes staff on. If you ame per en at the staff of the staff en dute al

2 Stope Model "PUP" Fump Driven by An & Cylinder Model C 36 Chrysies maul D. Engine Gov I Acquisition Cost 51: FHISTHY SPEED 2400 MPM-100 M.P. SOG GPM AT 175 PEI-PAR LLEL COMMECTION 300 BPM AT 275 PSI SEWIES CONNECTION

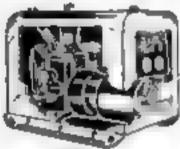
Ideal For . PIPE LINE SERVICE

· IRRIGATION · PICK UP . SALE WATER DISPOSAL

GATHERING - FIRE FIGHTING

 SPRINKLERT * CONSTRUCTI IN

These skyl mounted Pumping I arts are standard pe sur on mile . to h persong cared to be particularly where wide the are re over! To be our in and destarge pure alf the para P or series pump of the 1495.00 rmance data F 14 change 1495.00 for wither th sa 1 menotone 116 Wright 218 c 10c Mark in-struct one and peri rmance data



A. C. GENERATING PLANTS

Yelts-60 Cycle A.C. Single Phase HEAVY DUTY

DESIGNED FOR CONTINUOUS OF INTERMITTENT SERVICE

PLENTY OF CURRENT TO OPERATE YOUR- - DIL CURNER . REFRIGERATOR . HOME FREEZER . SUMP PUMP . POWER SAM . GROODER . CREAM SEPARATOR . INCUSATOR . VENTILATING FARS . MILHING MACHINES . BLOWERS . TARO LIGHTING . OTHER APPLIANCES

Totally enclosed power unit with 3 relinder water comed former. Model Bill cause direct coupled to grave a Magne of Just or 17 and a 16 d ga to not take 3 qt of rape 5 th 3 mounted with handes a fur care og his with 6 are the or of 18 per 5 to 18



Write for in-

MEW

* For Oraining Basements * Fire-Fighting P Irrigation * Fuel Transfer * Swimming Punis * Home Water Systems * Dewetering

This General Mutors A I son Centr fugal Pumb bra Hole fur use on C w trans the tent lighters now converted for commercial home

time from the go mine a section to a section of the man to a section of the man to a section the section of the supported 34" shaft have last simple or m

ing Rotation courser shell Buctien Head Shipping wt. 35 fbs. Gor't. 3400 p 2 g 0000 10 3500 3500 3500 2500 100 140 108 10



(17EM #115)

HYDRAULIC

with FINGERTIF CONTROL

M 1 t CARS & Feed Mills & Canning M nes & Conveyers & Labers & Series & Labers & Series & Labers & Credit Separators & Darden Fractors & Parish

Variable outrout appends continues to on the topogo thereof non-unit and the Mark to those and to the set of the set of the act and the set of the set of

p resure first and sizes. Use the se put to a High p treme my better planting dies, authorized and frame at a life to the life of the second and the second at a life of the s dies, dute frame al comment 010 J- (

female pipe m = postpatel ITEM 24 & 1 sterf double on on h drause as inder h white participant mentioned at the property of the many and the depart mentioned with with the contract of t Pastpaid

trans a Let busted not be his district extincts the first of the best of the b TEM 233C In a markets to draw ere of r

to the to the treatment of the control of the treatment of the control of the con From 2 146 has a set of listens at 1657

Postpold 16.95 # 104 theat a set mg h d au 15 and the property of the control of t restif h closed all

. 110 Coulde be a had as to reactive and shall and a short of the control of th j - 281 glim fr + ft på t nell

ATEM AND INCHES OF THE PARTY OF is made in

TEM 242 Itsu e action ha irau'ic cylinder 4 hore in 12.50



CONTROL HYDRAULIC Newly Monufactured to Our Specifications

Fig. an upon center employ below to the a mattered of a relative to related to related at a related at the control of the cont 21.50 me phi

NEW 48 - PAGE 1241 FREE:

loaded with autotanding War Surplus BARGAINS in form, home factors and workshop equipment.

ORDER DIRECT FROM AD - SEND PAYMENT OR PURCHASE ORDER TODAY - SATISFACTION QUARANTEED

CO. 1139 SO. WABASH AVE., CHICAGO S. ILL. DEPT. PS-10 SUPPL

POINTERS FOR HOME PAINTERS



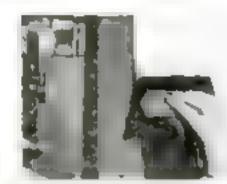
How to get better paint jobs ... make your brushes last longer



When you're palatrag overbend dip brosh to only one parch. Booseth chrush quackly Shirt in cornect of certaign Use short, agist strokes.



For evernight cleaning. pour on a little thinner work out mint on newspaper usand stack or point seraper to squeeze out paint, suspend brush in thinner.



On rough surfaces, brush first cont in well to cover all cavitan present entrance of most ire. Boush second cont. with amouth even strokes.



When you store brishes for longer persols clean thoroughly and wrap securely up manner shown here. Brushes. stay in better condition when they're kept in shape.

For best results use NYLON PAINT BRUSHES

Joh after job, you'll get best excuts with a well-tipped nylon point brush Ourable Du Pant mylan bristles don't brook off, even an roughest surfaces. They lest 3 to 5 times longer then ordinary bristles , paint smoother are clean and senitory. Nylon point brushes are made by leading monufacturers in all types and sizes. Look for the word NYLON on the handle.



Batter Things for Bottor Living through Chambilty The best brushes have -



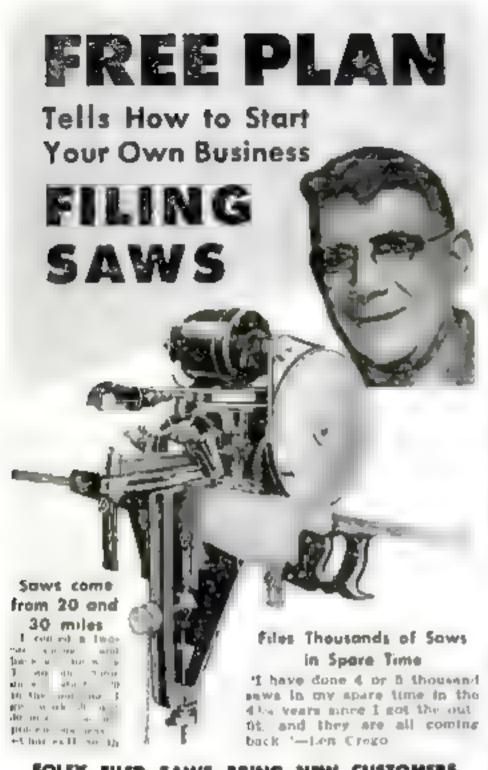
100 years of quality tools



Never before has America's need for dependable transportation been so great—in both military and civilian service. And never before have Champion Spark Plugs been in such great demand because of their reputation for economy, power and long life.

Quality products are always first choice and Champions have been America's favorite for over 25 consecutive years!

CHAMPION SPARK PLUG COMPANY, TOLEDO 1, OHIO



FOLEY FILED SAWS BRING NEW CUSTOMERS

Here is a steady repeat CASH business you can start in your own basement or garage in your spare time. Every saw you sharpen with the muchine accuracy of the Foley Saw Filer is an ad that brings more customers. S. M. Hollingshead wrote to use "I am doing very well with my body Filer, and I am glad I invested in your machinery. It is very satisfactory and works very well in the small community in which I live.

You can file all hand saws, also band and crosscut circular saws on the Foley Saw Filer. The adjustments are simple-there is no eyekrain-and you can want right away to turn out perfect cutting taws. The first naw I sharpened with my Foley Saw Filer came out 100%. I think it is a marvel of perfection."-writes Clarence E. Parsona

"INDEPENDENCE AFTER 401" #xplains how you can get business from hardware stores, home owners, formers, curpenters, schools, mills, factories, etc. Just think-with a modest investment, no overhead, no stock of goods to carry, you can start right in on a cash business that will help pay the rent, buy groceries, or a new car Get the facts-send coupon today for this practical, moneymaking plan. No salesman will call.



FOLEY MFG. CO., 1019-1 Foley Bidg., Minneapolis 18, Minn. Send me free book "INDEPENDENCE AFTER 401" Name.....

Address .,

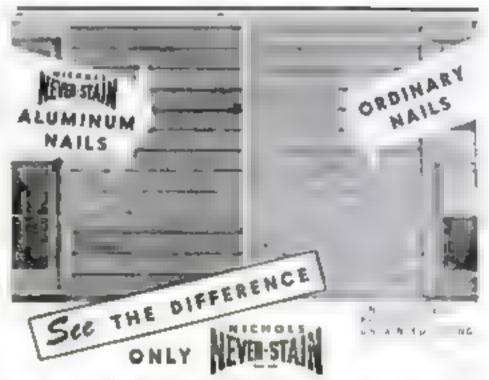
MEON REMODELING T'S easy and inexpensive to build an extra bedroom.

bathroom, game room, photography darkroom or whathave-you with Gold Bond Gypsum Wallboard. Just neil the

sturdy, fireproof panels right to lumber framework or over an old wall or ceiling. Joints can be completely concealed with Gold Bond Perforated Tape Joint System. Decorate with Gold Bond Sunflex-the one-hour wall paint, or with Gold Bond Color Texture, which goes on like paint and covers the wall like plaster. Choice of 8 brand new colors.

Available at your local Gold Bond lumber and building materials dealer!

NATIONAL GYPSUM COMPANY BUFFALO 3, NEW YORK



W F O WELL OW

OFFER ALL THESE FEATURES

- OR STAIR SIDING AND
- ECDNOMICAL TO USE— COST VERY LITTLE MORE THAN DROINARY NAILS
- WILL NEVER RUST STREAK NO COUNTERSINKING OR PUTTYING NECESSARY
 - · EASY TO DRIVE ETCHED FOR SUPERIOR CLEAN-LIMESS AND HOLDING POWER

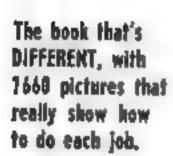
Look around your neighborhood and you'll see how ordinary pails have marred the beauty of painted siding. Never-Stain Aluminum Nails will not rust to cause unsightly streaks or stains. Billions now in use.



RICHOLS WIRE & ALUMINUM CO. . Davesport, lowa

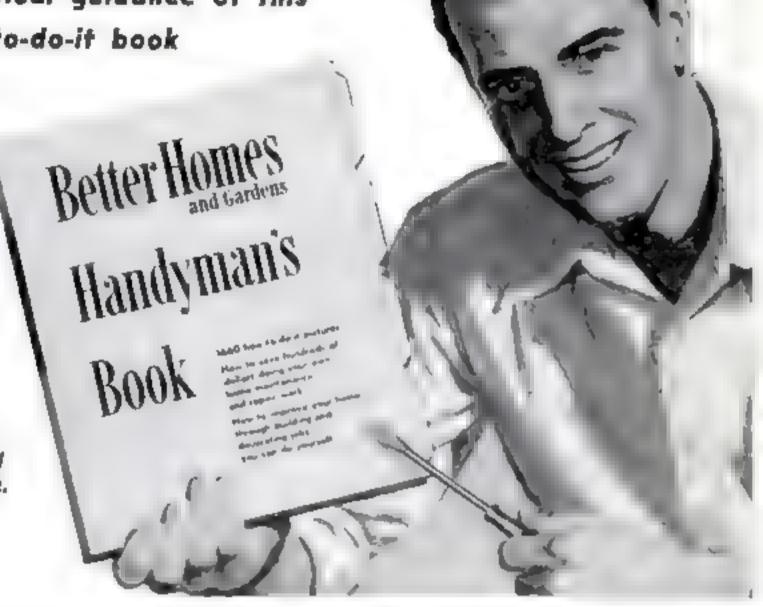
Save HUNDREDS of dollars and enjoy a finer home

with the practical guidance of this big new how-to-do-it book



Order NOW on 10-day money-back guarantee.

Only \$395



Why pay out your good money on skyhigh repair bills? You can handle those jobs as well or better yourself, with the expert know-how in this big new Handyman's Book, 14 full sections show how to:

Save hundreds of dollars doing your own home repair work.

Improve your home through easy-todo jobs you can handle yourself.

Step-by-Step Pictures cover home-repairs and improvements, inside and out— 1660 pictures that tell and show exactly what to do. Scores of expert short-cuts.

Amazing Value that you'd expect only from a big magazine like Better Homes & Gardens, which constantly checks best methods of home maintenance. Handsome grained cover, stamped in gold. Sturdy ring-binder and handy section-tabs make things easy to find.

buy books or hardware. Or order on money-back 10-day trial. Use the book 10 days. See how often it can save you many times \$3.95 — or return book and get your money back, Send coupon NOW,

The A to Z of repairing and improving your home:

HEATING. How to Heduce fuel coats Service oil or das Clean channers, etc.

Plumbing. How to Open clouded drains Than fevres pages for lenky faucets, etc.

ELECTRICAL. How to Replace fuses safely (are for appl ances Prevent 'shorts, etc.

WALLS. How to Waterpress basementa Install wad panets Hang wall paper etc.

STORAGE, How to Instant kitchen cabinetic Build storage with Bemodel closets, etc.

WINDOWS. How to Fix broken sash cord Replace broken panes Cure "stocking," etc.

FLOORS How to Refinish floors Repair wood or tile Lay lineleum, etc.

EXTERIOR. How to Use empete or brick Repair foundation. Pix leaks roofs, etc. FURNITURE. How to Repair unbettering Remove more or deals Lee feats while etc.

POWER 10015. How to Use saws and drive Use made purposes tools Keep assets first, etc.

NAND TOOLS. How to Select for utility Use for hest results heep sharp, etc. FASTENING. How to Use manuary fasteners Use at ler and talk Glow for keeps, etc.

FIRISHING, How to Remove on at variable Paint walls and true Paint your house, etc.

LUMBER. How to Judge Jumber grade Burnge used luming Cornert defects, etc.

and hundreds more, completely indexed

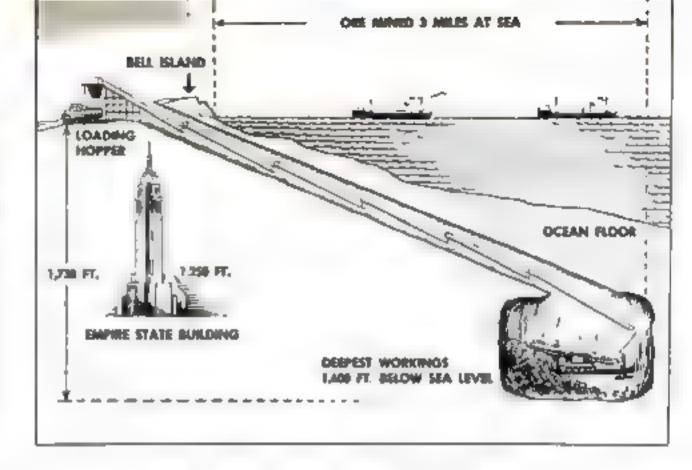
Money-back offer MAIL	COUPON
Better Homes & Gardens	
1410 Meredith Bidg., Des Moines 3, fawg:	
nas imprist 9! 16MB;	

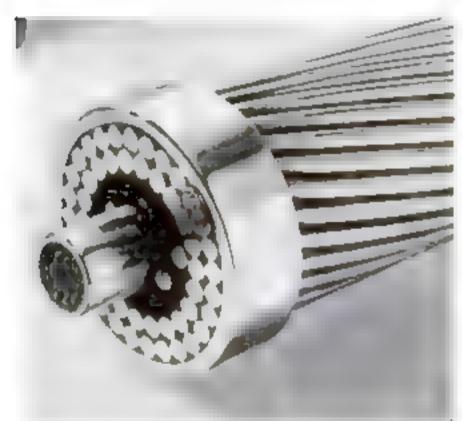
Please send at once my copy of your big new Handyman's Book, on 10 day trial. I enclose \$3.95 — which you will refund in full if I decide to return book in 10 days, after receiving it.

Name	******************	
Address.		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,

2½-Mile Belt to Haul Sea Ore

THE longest and highest slope conveyor ever used will soon be installed on Bell Island, Newfoundland. It will haul iron ore up a 12,-500-foot shaft from a mine 1,600 feet below the surface of the ocean. Designed by Goodyear of Canada, the 36-inchwide belt will deliver 1,000 tons of ore an hour.





Wire Carries 330,000 Volts

The world's largest electric cable for overhead transmission will be installed in West Virginia to carry 330,000 volts, highest ever used in America. Since current travels mostly on the surface of a conductor, the 1.6-inch wire is needed to handle the super-voltage. A 4,500-foot reel of the steel-and-aluminum wire, made by Alcoa, weighs five tons.

Maple Syrup Flavor Tracked Down

THAT deheate flavor and characteristic color of maple syrup is not present in the sap taken from the tree. The qualities are developed by the action of heat during boiling. Scientists at the N. Y. State Agricultural Experiment Station have proved this by preparing a batch of syrup by a new freezing method. It turned out gray in color and unlike normal syrup in taste.

'Bubble' Shields Wounded

This new litter (below) for evacuating wounded troops by helicopter replaces the old "coffin-type" carrier in which wounded often suffered from claustrophobia. The clear-plastic hood protects a soldier from wind blast and exposure without confining him or limiting his vision. The nylon-fabric cover for the lower part of the body has pilot-controlled heater ducts. Made by Bell Aircraft Corp., the sheet-aluminum litter is easily attached to a helicopter's landing gear.





ALL PRICES LISS MOTOR F.O.B. KALAMAZOO, MICH.

- AND ALL CAN BE OPERATED FROM I MOTOR

Look at the tools . . . look at the prices! If you're one of those men who have long wanted a home shop equipped with fine precision tools, but haven't wanted to spend the money for large, expensive machines — these Atlas Workshop Tools will suit you to perfection. Each one is backed by 40 years of Atlas precision-engineering. They give your shop greater versatility at less cost than any tools of

SEND FOR FREE CATALOG combination tool you can be powered with 1 motor! Yo

combination tool you can buy! — and all 5 can be powered with I motor! You'll want to see them at your first opportunity. Ask any Atlas or Atlas-Power King dealer for full details. Send the coupon for complete catalog.

OF YEAR ATLAS PRESS COMPANY
1055W N. PITCHER ST.
KALAMAZOO, MICH.

DEPENDABLE QUALITY TOOLS



* Husky Atuminum Oxide Type Insulator assures against porosity—sure proof against shorting.

* One-Piece, Leak-Proof Construction.

* Pagine Gasket Retainer Ring assures better contact and better heat transfer.

BOWES PLUGS

are tailored to YOUR car's motor

If your favorite SERVICE STATION does not handle Bowes Spark Plugs, write us direct for further information.

BOWES "SEAL FAST" CORPORATION

INDIANAPOLIS 7, INDIANA

Four Photos on a Single Sheet



You can make four prints nearly 4" by 5" in size on a single 8" by 10" paper by taping the contact-printer glass this way. A L-shaped piece of black paper masks out the unused portion of the paper during each exposure. Such multiple prints are good for an album.—V. Hanson, Los Angeles.

How to Make Dividers

MY FAVORITE dividers are a pair I made from 3 16" drill rod. First I heated two pieces to a cherry red at one end and flattened the heated ends for about 1%" to a thickness of 1/16". Then I ground long tapers and sharp points on the other ends.

The flattened ends were drilled for a %" bolt, which was held with a washer and nut. The pointed ends

DARLE POR

were next heated to redness and quenched in water. After polishing, they were reheated to a straw color. The nut adjusts joints.—George Berkwitt, New York City.

Old Brush Handles Fit Files

Salvace the handles of vegetable-scrubbing brushes discarded by your wife. You'll find they make excellent handles on small files.—P. Stillwell, Anaheim, Calif.

ECHANIC - # 85%

Portable LIGHT PLANT PUSH BUTTON BYANT 500-700 WAIM 110 30 2 - 60 Eye A C Tuw ered by a startly dependstate casy starting air run of the property services are puring the property such as the property such as the property of the ly of rure I for any old

turner, it care brisder from 24 pump, emergerer shis, etc. which require up to 7 M us to like a like Coupless with a immeter and has his win 2 to things 8 v ago in error, Will's to Fully granchiteed Bu prepared by war ar three brooks out some I non.

700-800 Watt Plant Item 44 come \$169.95 he 3 in a life greater out that 4h come \$169.95 hoos those wast Plant Item 4h come \$199.56 CHANT 2000-2500

WATT PLANT Absolutely the Best made hereage of relating developing to 5 list was the property of the prop for evolor start-

for wolfer starts

In g is (6
In g is (6-

38 Pc. DRILL KIT KHAP diana proping
well bilds are
where a been b
i takent interference
the letter in a teal
we with 13 thm to

there we in ever to a second there we is a second the second to a second the second the

ACCESSORIES FOR 1/4" DRILL

Make complete workshop out of your ta'd in the far three countries in accommode Qu'h charge mort boat in de t chie his wall from y it to too in her cops with Press store but to d' knich boat inch alsot fractory guar

POWER HACK OF

with the problem steelight or reserved with which y or prise and to the foreign wheel region of the or the foreign of the fore

ELECTRIC HAND SAW The famous Arm haw con-

denth As a well ent for the Wt. 3

Pawer Sander & Polisher tom 6 Make unit work of work of we brillion when the prothe property of the state of th 14. 00

antel my attache whitch is a to a er the ng of the render for party of the party of the ER said Pg of the children of \$16.50

charged at I sup FIRE EXTINGUISHER the process product first go ages or at the process product for a first go ages or at that are to a first as a cylinder of the part of the process of cylinder and all process first in the part of the process of the p d wide

LARGE FIRE EXTINGUISHER TOTAL te. 3 a 14 in 275 co in het p 14 sed meet rytinger charged in 1 286 be ore with 12 Equipmed with p the Betalable Hose hert

Betwieber V miles fire to be \$15 85 HEAVY DUTY ARC WELDER

cities at the ma portable to apply welder 250 amps, DC Service moved by the pears of break bir from E in the me the artistry. While handle is his or a manufactured by the artistry of the property probable in the artistry of the property probable in the service of specially designed mer a maker by the match and such treathed grown with the match and such treathed grown with the term of the property of the proper

with the lift is to to a few to be bow heat wild receive a strategy bear of the bow heat wild receive the lift of the bow heat will be so with the cat of extends to be the

28 pc. BENCH GRINDER KIT

ritem 711 A support preclated distinct of parties to 1, no At 110 to 1100 cp.m.

At 110 to 1300 epen heavy study no test process moth trees of the second state of the second state of the second second of the s bit. LCH. dead church

Here da Stant - vic a a ray or cy follow to ter me die or per a complete to in a complete t Hern \$1. With log double tank



POTTERS WHEEL

t ern 47 Comptete

or while he prive red many regarded to be a second to 140 spec controlled by

32 pc. SOCKET SET

Den Su Highest 17 14 6 17 14 6

drive d speeder th utile 30 h tarana ton two pr worth 612 10 \$15.95



RUBBER HOSE

New group or Nem-er no 11 s. could Pur b

frem france. an Ballet Pro-Fue Out

Ire de Bram.) 1" Length 30 ft. Price of sportfied

THE HYDRAULIC HOSE herd of A LICENT H Inread Morman Wi per lette

EXTENSION CORB

IXTENSION CORS

Ittem 18: 40 Pt. heavy
duty made of specialty
insulated No. 14 2-conductor wire 80 tongs that
you can drive user it and
yet among the children
yet among the children
put can drive user it and
yet among the children
put can drive user it and
yet among the children
put can drive user it and
tong telle with heavy ratherer play and market
we 2 yith t mad y ha 50. Second 40 ft \$1 90
tong telle with heavy ratherer play and market
we 2 yith t mad y ha 50. Second 40 ft \$1 90
tong telle with heavy rather play and market
we 2 yith t mad y ha 50. Second 40 ft \$1 90
tong telle with heavy rather play and market
we be only five and 1 20 ft total 100 ft \$4 00
THENCH LAY bridge to No 7 tongs 100 ft \$4 00
THENCH LAY bridge. Item 51 Among da
y a 3 could for started service to larrie, out
discretely a pic About goly property into an indi
and market with \$100 ft come, the poer ft \$50
ft like part ft \$60 ft come, the poer ft \$50
ft like part ft \$60 ft come, the poer ft \$50
ft like part ft \$60 ft come, the poer ft \$50
ft like part ft \$60 ft come, the poer ft \$50
ft like part ft \$60 ft come, the poer ft \$50
ft like part ft \$60 ft come, the poer ft \$50
ft like part ft \$60 ft come, the poer ft \$50
ft like part ft \$60 ft come, the poer ft \$60
ft like the part ft \$60 ft come, the poer ft \$60
ft like the part ft \$60 ft come, the poer ft \$60
ft like the part ft \$60 ft come, the poer ft \$60
ft like the part ft \$60 ft come, the poer ft \$60
ft like the part ft \$60 ft come, the poer ft \$60
ft like the part ft \$60 ft come, the poer ft \$60
ft like the part ft \$60 ft come, the poer ft \$60
ft like the part ft \$60 ft come, the part ft \$60

HEATING & VENTILATING FAN

HEATING & VENTULA

It n to have y (negative) in currance papers. Forces even head, it is from the property was at the front at the set of the property of the set of Fan. w. 2 Dec. 80 48



HIGH PRESSURE HAND PUMP

direct type top 3 a gid put is wift prices no 3 increase price now suret toe fue fue) of transfer of in min, theorem and creft of for a seen high, we are marry passessy about 1 au a Wij Bin Great court is a seen a

VARIABLE SPEED SELECTOR

Henry due prode by 8. F SOORICH for culture and use for other die not nevert. Herefor the state of the parties of the state of Chafe Pr. Par house a frage Fing the L 4 chico, racy I and 169

to the first of th partiffer \$79 80 \$89 10 and \$1



TLECTRIC HAND SAW Arts niver for a life office would be for the judgetter to to make the makes property of the second of the

dust blower Autom to raise in part in the first of cut the first of cut the first of cut the



GAUGE TESTER HOME CAN DE MENTE STATE OF STREET

8" TILTING ARBOR SAW

July ton a little to the feet of the feet all the Pa R 4.7 % gy sarel the e

have a property of the party of depth-\$15" cut depth-219" cat to as cat it retired to a seed in proceed as a larger of the total or and a residual to a seed in the process of the part o

MANUFACTURERS AND JOSEPS -We to we about your sure so stems

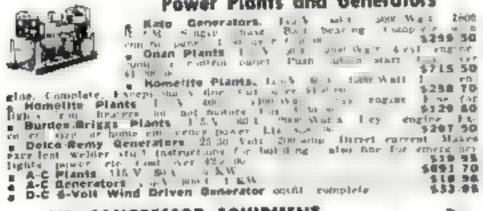
904 807 901 All Home brand new, Prices La.b. Chicago area. un. Sand shook or M. G. 10 day Money back o MASTER Mechanic MFG. CO., DEPT. 74



. WAR SURPLUS . EXCESS INVENTORY BANKRUPT STOCKS

During Sale We Will for Act Sh uping Chargest

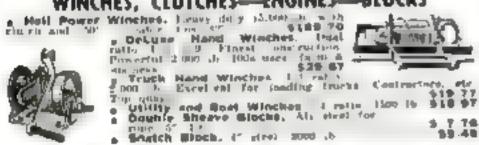
Power Plants and Generators



AIR COMPRESSOR EQUIPMENT

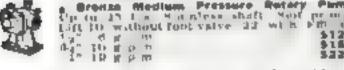
Paint blow upters clean kan tree with compressed my dated you. Den pas at a hi in same and compensate the Friend of the gar as paint gap blow gan distings tree chuck him exist up to a series up to a compensate the first tree to be a series of the first tree to be a series of the first tree to be an officered. The components of a compensate will be a series of the series of the

WINCHES, CLUTCHES—ENGINES—BLOCKS



Water Pumps—Water Systems—Weed Spray Units

Automatic Presture Water System, Leading make, For Bronza Medlum Pressure Sutary Pamps.





322 96

Bronge Nigh Pressure Solary Pumps, to to 13m the Systeless share set principle 1 it 1 was a food easys 32 with top quarts und blove by 52 per \$14 \$0, 5, 7 Mg per \$20 \$0, 1 t pp m \$27 \$5. Contribugal Irrigation & Piccot Pumps, 40 trop brother date can what 75 m pro feet to a sur 11 des Sa bearing \$34 The east over bit, as my consistent trove bross to be with the passe trake at over bit, as my consistent trove bross to be with the passe trake at over bit, as my consistent trove bross to be with ground to the first passe of the passe o

MISCELLANEOUS CLOSE-OUT EQUIPMENT BARGAINS

I mited quentities. Order promptle to get in an three

E. Decimion Magnetic Wecorders. Lot one. For home or office.

Records over this over treased have with laters one. For home or office.

Records over this over treased have with laters one. For home or office.

Retail Magneto Phones. Was the Majorn one. Just 512 40.

Private Magneto Phones. Wast yet Matern Time. \$10 79.

City Up-Right Desk Phones. Many parts instructions. \$1.99.

Molor Gyra Units. It is will ten on A functions \$1.99.

Direct Reading Tachameters, but after it is Leading make \$1.29.

Direct Reading Tachameters, but after it is Leading make \$2.90.

One. Are Welders time to notifie 22% to it summittee \$1.39.

One. Are Welders time to notifie 22% to it summittee in the driver of the parts of the majority of the parts of the majority of th

WIND DRIVEN POWER PLANTS

· Ideal for aights radio battery charging Fine for remote camps farms etc. • Complete, 6-volt, 30-amp d-c generator 7-ft. propelier, relays, 6-ft steel tower etc Brand new, Original cost \$95. \$33,95 SALE

BURDEN'S 38-Year Policy: Secretaling guaranteed perfect. We may all shipping charges in U. S.A.

ORDER FROM AD or Write for Free Catalog!



832 "O" ST.

LINCOLN, NEBR.

CAMPBELL-HAUSFELD Spray Painting Outfits

Outperform them all!

O more and better painting in an hour than you can brush on in a day. Same compressor inflates tires, lubricates cars, tractors, implements.

4 models, precision built for trouble free service. Last a lifetime. Gasoline or electric power.





See them at your dealer or write for literature, giving his name.

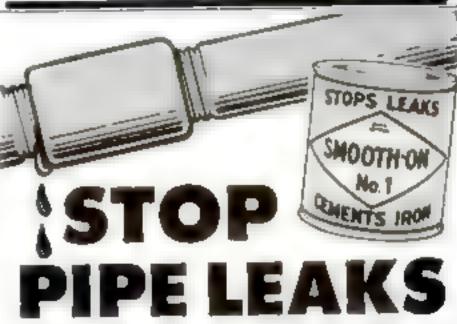
pressure

New Low Priced Pressure Maid . . . dwarf In size . . . glast in power,

THE CAMPBELL-HAUSFELD CO.

151 RAILROAD AVE.

HARRISON, OHIO



with Smooth-On No. 1 Iron Cement. For over 50 years a bome repair stand-by for stopping steam, water, oil and gas leaks in boilers, furnaces, tanks, stoves, etc. and for tightening loose parts. Get a 13/4 oz., 7 oz., 1 lb. oz larger size at your hardware store and keep ję hundy.

40-PAGE REPAIR HANDSOOK

Shows many useful repairs you can easily make around the house and on the car. 170 pictures. Write NOW for free copy.

SMOOTH-ON MFG. CO., DEPT. 58KA 570 Communipaw Ave., Jersey City 4, N.J.



80 362

THE IRON CEMENT OF MANY

Now YOU can do it!

Your bathroom or kitchen can have that smart, modern look with ...

"INSTALL IT YOURSELF"

KON METAL TILE

VIKON TILE Is Economical ... Easy To Install

Here's how to put new life and sparkle into drab, colorless rooms . . . quickly and inexpensively . . . with Vikon Metal Tile...do the entire job yourself in your spare time! It's ideal for walls and ceilings of kitchens, bathrooms, showers, laundry rooms, utility rooms and game rooms.

You have 30 beautiful fade-resistant decorator colors to choose from in both steel and aluminum . . . also stainless steel.

Look at these features:

- · Will not warp, chip or craze
- Resists heat and ordinary household chemicals
- · Fireproof, waterproof, a seal against insects
- Can be bent for corners or cut to fit special needs
- Easy to keep clean



"The Original Individual Metal Tile" Established 1926

FREE SAMPLE and COLOR BROCHURE

Send teday for your free copy of Vikon's full-color, descriptive brochurg and sample of tile. You be the judge of its quality and adaptability to your home. No cost or obligation involved. Simply fill out and smill the teupen.

VIKON THE CORPORATION

WASHINGTON, NEW JERSEY, DEPT. PS-1

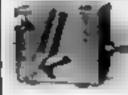
Please send me without cost or obligation, a full-color, descriptive brochure and sample of Vikon Tile.

Name

(Piesse Print)

Street Address

..... Sustr.... Zone..... Sustr....



It has infinite Speeds 0 to 350 Rever Automatic Overboad Protection 11 and in Torque up to 180 inch paules 3g input at Output Shafts 11 was hoodle 4 to 113 K1 M 107 Case measures 7 2 nous 7 high 51 when VALUE OVER \$300 Shapping Wt 252 On Seets \$54.8 Shapping Wt 25# On

DIREIUS MACHINE SHOP "S" 1423-25 Sa. SEM Ave., Citary 50, 101.

a 10% Deposit

◆-1004.00

TO SILOS EACH

- SCREW DRIVERS

America's most popular tine of inecuratelypreced screw drivers! Wide range of sizes. FULLER TOOL CO., Inc., \$11 Fells St., New York St Il orld's largest maker of Amber-Hundle Tools

THREE WAYS WITH A NEW Cohman

Feb. Chicago

WRITE FOR FOLDER AND PRICES **DEPT. 20-S**

Get the big three Cushman economies—low purchase price, low operating cost, low maintenance. Ride the Cushman scooter to work, school or shop. Less than a penny per mile to operate. Dealer inquiries invited.

CUSHMAN MOTOR WORKS Lincole, Nebr.



The Dreme! Sharpener guarantees a sharp, fresh blade everytime you shave. What's more... it assures 180 and more velvely-smooth shaves from only one blade. That's a fact... proven by men with all type brands. Just imagine one blade giving 6 to 12 months of shaving delight! Blade savings? Sure... but even more important... a perfect shave every time. It's the biggest shaving news since the safety raxor, and you can prove it to yourself... without obligation.

PERFECT GIFT FOR ANY SHAVER!

Fine abrasive rollers hollow-hons edges. Leather rollers strop them . . . all in one operation . . . for keener cutting, longest blade life ever. And even new blades can be sharpened to personal beard requirements with a Dremel. Speedy only 15-20 seconds makes an average double-edge blade sharp as new often befor Order yours today? (All-plastic housing 215"x3 ."x3". Universal motor—110-120 Volt. AC-DC Double-edge blades only)

10 DAY TRIAL—MONEY BACK GUARANTEE of dealer ply, order by mail Try the Dremei Sharpeher 10 days. If you don't get better, amouther, and more shaves then ever before, return Sharpeher in good condition for prompt cash refund

IF DEALER CAN'T SUPPLY—USE THIS ORDER

BREMEL MANUFACTURING CO. . DEPT. 121E . RACING, WIS. Kindingsod in \$9.68. Ship Dromet Sharpener postpand.

Name			,	+	+		+	,		+	4			+										,			
Address	÷		p		r	+	+		+	4		+	4	h				+	d + h		4		-	h	+		
City		+	r	ı		ı	+		+			+		+	2	2	ine.		Sta	L	r.		-				,

HAVE MORE CLOSET SPACES

H's easy
and meney-saving
with this NEW
Build-it-Yourself Pattern*
and Stanley Sliding Door Hardware

You can easily double or triple your bedroom closet space . . . have convenient storage dosets in the hitchen, living room, garage — and at a cost you can afford! Easi-hild Pattern* now simplifies closet-making.

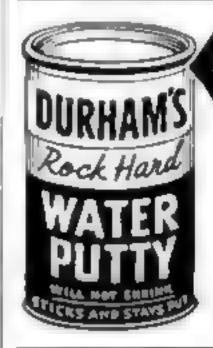
No special tools or skill required — pattern contains complete, easy-to-understand, step-by-step directions (written and illustrated), actual-size patterns, and complete list of materials.

Stanley Sitiling Boor Hardware to the key to this low-cost way of solving storage problems — gives you the most closes space in the smallest erea. Simple directions make it easy to install hardware in minimum of time, See your hardware dealer for Stanley Residential Siding Door Hardware and East-Bild Closes Wall Patterns & 263, Oy send 50c for your FATTERN TODAY.

*T. M. Reg. U. S. Pat. Off.

enclose	nesentville, M. Y. io coin, money order, Send to
Wall Closet Path Stanley Sliding Da	om #263 and full details a or Hordworn,
Nema	
4.4.4	





The Modern PLASTIC for lasting Home Repairs

PERMANENTI.Y mends cracks are holes in wood, tile, stone or plaster. Sticks and stays put—Does not chip, shrink or fall out Easy to use. Economical Mold at, chief it polish or paint it, If unobtainable from your lumber, paint or bardware dealer, the big 4-lb, can will be sent you post-paid (in U.S.) for only \$1.15. Full money-back guarantee, order now.

BOX 804-V, Des Moines, Iowa

GUP TO EECT	
PLASTIC GLUE FOR WOOD	
ità NEW	
ita FASTER	
3 STRONGER	
The state of the s	
• EXTRA SPEED—Strong bond in just 30 minuted • EXTRA SAVINGS—Spreads 25 % further! • EXTRA EASE—No heating or biending ready to use! • EXTRA BEAUTY—Transparent when dry!	
This empling plantic glue replaces old type gives. Heady for immed alf- use allows athors assembly time the SPEEDI-GLU on white. How- lears tabrics paper ceramics leather parents policy fell, fibre, etc. Exertient for gluing formire type plantics to wood.	
Samo NOW . All orders postpaid 4 of 59c 16 cc.	

WHITE ADHESIVE CO., NEWTONVILLE GO. MASS.

(Who exale Quantity or on Request 1

HAVE FUN. SAVE MONEY with PRACTICAL QUALITY BUILT

PROJECTS HOME MAINTENANCE SHOP



MOTO-TOOL MIT No. 2-Dremel 1 Model 2 Moto Tool to the Instead most powerfus took is also class the sets approximately at engine and a principle curves could be be engaged sharp one pie search well in most, plus too meta. Save pleas inches on the second contract of the pieces of the pieces of the pieces. maintenance good. Performs hundre sof shop operations, and for look like it a a solar Processor totale a second 1 0 120 V V 1 1 1 I Mn or Mnto Tool No. 2 may 218 at 1 amounts felt in 6 23 to the quality, abopt tested accessories. If the apend after 1 ml \$23.50 to a Grind me Wheels, No short at 1 Only tern, Grinding Wheets, Possibers sic v. Only

MOTO-TOOL KIT No. 1- Contains lighter expectly No. 1 M do Tao' with 34 accements to el tamers, grin ig whee siete) to attractive incurer finish wood rave in grant bargara a the field! Took atone with I emery wheel paint to on a \$17.50 \$10.90 Complete & C. Onle

PORTABLE DRILL PRESS - 1 are No. 7 Moto Tool) Adda served in a 'o M o Tool perso in bleat for madel and or made carrier, rolling, etc. Preciator built .2" \$9.95

model 2000, sander-policier. Pagest select to the field Stegacht I'm required on not on gurrantees is sich five strakes per men't fast rutt me bro-her ion cames | 1 to san fing refin a also and redecorating. Lives you necessary power cost one

hand operation, and 25 to in of randing surface for furniture makeing loss boulding or refin t like resultating same areas, all ding especially in such a 17 wall join a washing a ling with extenden-2 - need of nermance adverse, abreporate and, their

MODEL "A" SANGER-POLISHER-MASSAGER- | | | | | | | | | | S as a fr mark be with same considering features at piger and to the beauty, else with time metros for exact fire flatches and to ten strakes her to by let the most popular ander ever offered some on men some a ven habby rely for all metr arms ng. pulas the reflect the tasks Alas a souther manager We 24 for, souther part 21, " a 1y" down lets will and d sand \$14.85 papers & fest and sheepsoon populoag pad, Only

RESCURIC COPING NAW Sufe as a hambar case scrotte be made a same as it same been to home boths. Teles theorem work of no of set food pleases so much for an II be cost Works in any direction sounds a delivers 7280 strokes per into Same a fought by not I un that I would at find a talence speed. Trigger four foodproof a ton 100 x 3 mining parts mere needs oil og 110 a10 1 A C force plans parked with each same for 6 see ful tringle property and for modern parked with cach same for 6 see ful tringle property and for modern parked with cach same for 6 see ful tringle property and for modern parked with cach same for 6 see ful tringle property and for modern parked with cach same for 6 see ful tringle property. binder. Itnig.

DREMEL Electric TOOLS BOLD BY BETTER DEALERS EVERYWHERE-

GET STARTED RIGHT . . . MAKE FASTER PROGRESS Easy-to-Assemble Kits for Beginners . . . Supplies and Tools for Experts

if you are a beginner, Just becoming interested in the fascinating hobby of Leathercraft get off to the very best start with LARSON Ready-Cut K to of purses. belts gloves bi-studs woolskin ammais, etc. No experience or tools needed complete instructions for easy assembling included. SEND 10c TODAY for big new litustrated cate og of ideas kits, materials. supplies for both beginners and experts.

J. C. LARSON COMPANY

828 SO. TRIPP AVE., BEPT, 717, CHICAGO 24, ILLINOIS

For more experienced leatherworkers, our stock of supplies tools top quality calfaking, and moderate priced tooling leathers is the most complete and varied in America

J. C. L./ Bept. 71	T. #20 S.	Tripp A	ve., Chicago	24, 10.	
I am er	rathereral	Ge. Plens Leatning	e send ma	latest big	titus-
Name					,,,,

Address

City

Blate



Everything for Experimenters, Builders, Amateurs, Servicemen, Engineers, Soundmen...

Save money on every Radio and TV need! Get the big 212-page 1952 ALLIEO Catalog featuring the world's inrgest selections of top-quality electronic equipment at lowest, money-saving prices See the latest in TV, home radios, Amateur equipment, P.A. systems and Hi-Fidelity custom sound, recorders, lest instruments. builders' kits - plus thousands of parts, tools, books and diagrams. Get more for your money from the World's Largest Radio Supply House. Send today for your FREE 1952 ALLIED Catalog!



LIED RADIO

ALLIED RADIO CORP., Dept. 7-K-1 833 W. Jackson Blvd., Chicago 7, III.

□ Rush FREE 1952 ALLIED 212-Page Catalog

Name		
4		

Address	
Address	

City	ZoneState

YOUR POWER TOOLS-TILT/ARBOR

Exclusive GIL-BILY Bulld-It-Yourself Features

So much ning to diseasily with hand funts only. Not these to seed up a set of seed of other pipes fact care indicated a consequention start, which produces are consequentions. Cap. I start post repaires of commercial saws set for for 540 and up.

BANDSAV BELT SAMPEI

GIL-BILT 10-INCH TILTING ARBOR SAW

17x48 in tall e 15kg in copac-its in the result bloom

This full 45 derives 3 la to deep.

This full 45 derives

Figur prode; 34" high, table all
ways stays revel

New Departure ball beating arbor, 44" preerror shaft turned down for hy" bore
brades alum fluxting shipped ready to run

Journal and raises hispe

Last and trainer hispe

Last and trainer hispe

thes and their mater gauge and self-stiga-

c.t. life Meta. Larty & Clarindes Plans half to army of set for el gangle and car r p fetts a govern dario sesent lock knows for a set scher me army set for a plant manufacture of the meaning and all scher have known by a set of the continuation literature to the same by the first physical of Hade 123 00 manufacture by the first physical of Hade 123 00 manufacture by the first physical of Hade 123 00 manufacture by the first physical of Hade 123 00 manufacture by the first physical of Hade 123 00 manufacture by the first physical of Hade 123 00 manufacture by the first physical of Hade 123 00 manufacture by the first physical of Hade 123 00 manufacture by the first physical of Hade 123 00 manufacture by the first physical of Hade 123 00 manufacture by the first physical of the firs

GIL-BILT 12-INCH BAND SAW

GIL-BILT 12-INCH BAND SAW

I may be a the up to death their

Hand be a the up to death their

I say in the able the ab degrees

Lower was a detailed the policy runs on two

legarings that the arrange tension and the mechanism of

rast a um burn completely assembled

Lower and themse their degrees

Completely assembled

Lower and themse their degrees

Completely assembled

Lower and themse their degree

Completely assembled

Lower and themse their degree

Lower and themse their degree

Completely assembled

Lower and themse their degree

Lower and themse their degree and a tension

Lower and the same the degree their degree

Also evaluated the same the refunct of the degree

Also evaluated—France and Parta His fee Belt Lander and a Tiff/Table

Low Coder Plans at \$1.00 each—Lower belt Lander and a Tiff/Table

Low Coder Plans at \$1.00 each—Lower belt ander and a Tiff/Table

Gilliom Power tools

Colline to the fact degree to the code of the field

Gilliom Power tools

Lower tools

Lower 21, Mimouri

SHARPENER SAW



Table model, gome and sharpnor rip saws combination saws a cut off saws ideal for Hi leaw" blades than i' to 20" dath a mispete with the protor & I grinding wheel & ord 564 for b Portland. 8. 10 at FOR PRIE LITERATURE.

P. T. NOBES MACHINERY

Now type HIGH NAWFIL parmaters magnet Anneal will never welles to one at use to FIS possible seed to ski (We plot \$4 %).

No extent to needed to Thirving to a task of etc. from under
water or other no coal a place. However have been housed by a wife
etc. from a legal of two a up because to the MANY there are
to from a legal of two a up be a transfer to the MANY there are
to from a legal of two for the foretrained AT of the MISK money
refunded if but to be parased. On magnet NOW to up
to the Opin Don tott larger alger also pushfalle.

HONALD EVELCH, 1215 W. Melaceke Ave., Milwaukee 4. Wis.

"WOVEN-Gards

Hand Protection at Amazing Low Cost

"Woven-Gards" are hand protectors mitte, pade and sleeves made of a new long wearing safety material. provide flembility comfort, resistance to abranou and cutting far reyord that of anything used before. They are extremely oil about sent and do an excedent ob when hand ng oily a inpery sheets. The porous weave makes them one of the finest protectors for handling lower temperatures. Buthustastic users say they have never seen values lake Expellent protection at Gards lowest cost. Send now for descrip-

INDUSTRIAL GLOVES CO. 1940 Garfield St., Danville, Ill. sin Canada, Sufety Supply via. Torontay

tive folder and prices.





TRANSVENEER brings you authentic reproduc-tions of beautiful Mahogany, Walnut, Oak, Blonde Prima Vers, Marble and Leather, Comes in film-like sheets you yourself can quickly apply to wood, composition board, glass, metal, plastic, or any smooth surface!

IDEAL FINISH FOR FURNITURE—makes inexpensive pieces look like rare and costly wood! EASY TO APPLY, durable, washable, heat-resistant, Application materials and directions come in handy Kit. Buy at Dept., Paint, Hdws. and Building Supply stores.

Write for free tample and pattern folder,

TRANSVENEER Division of - 1905-C Public Sq. Sldg. - 0 Cleveland 13. Phot .

> BUY U.S. SAVINGS BONDS

WAR SURPLUS BARGAINS



GENERATORS 115V-AC

FOR AUXILIARY LIGHT PLANTS

NOW ... how's the buy of the year Board new Religion Georgesons in the proposal base

These generators have an AC marget of 215 value, 28-4 amps, 1200 mass, single phase 800 system at 2400 R P.M. They also have a DC, notput of 286 coles, 60 cmps. The most has a spirar draw shall and a self exceed, it will serve as a dependable

111 V AC auxiliary hight plant when driven by a gambag. engine for faces, correger, found highering, crasters, heart, or wherever pursue in ant readily accessible. Shapping or 35 dis. Gort con own than all rates willing price. FOR Analysis



BRAND NEW POLE CLIMBERS

Buckingham pole climbers only \$2.95 in their original package. (Without Straps)



LINEMAN'S TOOL & SAFETY BELT

Brand new web-type belu 18 their original box.

SPECIAL 53.95



STRAPS & PADS ... for climbers

Used.

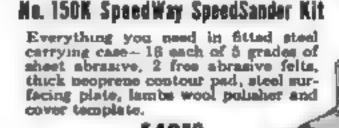
SET

All Equipment F O B. Paradona v. Enclare Pati Amount with Order





Makes dull, tiresome jobs fun. With this professional motor-driven, orbital-motion Speed Sander, you can quickly and easily re-surface and refinish furniture, woodwork, walls or metal . . . can sand-off old paint, stern, enamel, rust or corresion; smooth rough plaster; or buff, burnish or rub to a "piano finish." Operates with wet or dry abrasives. Three 41/4 'x61/4 covers cut from 9'x11' sandpaper or abrasive sheet Your local dealer will gladly demonstrate.



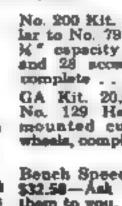


Far advanced in design and construction these new Speed Drills are lighter, bandier, yet more powerful and faster-drilling than more coatly old type drills, Dri); steel, wood or concrete. Quatity built for lifetime service, of die-cast aluminum with cast-in air cooling system and self-lubrication. Heavy cut-steel gears. Ball thrust bearings. Your Speed Way Dealer will point out the many other superior features.

SpeedWay Kits Make Ideal Gifts

Any crafteman or "Mr Fix-it" will be thrilled with a Speed Drill Kit that drills, grinds, sands, buffs, polishes, No. 79 Kit provides a No. 79 54 "capacity 18. 79 (in steel) SpeedDrill, a SpeedStand, wire brush, sanding duce and backer plate, cloth

and lambs wool polishers, peint stirrer and proces in all is fitted steel carrying care, complete \$32.50



No. 200 Kit. (Not illustrated) Similar to No. 78 Kit but with No. 200 %" capacity (in steel) SpeedDrill and 28 secondories in fitted case, GA Kit. 20,000 r.p.m. SpeedWay No. 129 Hand Grinder with 18 mounted cutters, brushes, and wheels, complete in leatherstie case.

Bench SpeedGrinders-\$16.58 to \$32.58-Ask your dealer to show them to you.

MANUFACTURING CO. 1864 SO. 52md AVE., CICERO SO. N.L.



Compare

SUPERSHOP

FEATURE for FEATURE DOLLAR for DOLLAR

Buy SUPERSHOP direct from factory and save. Lifetime lubricated be I bearings. Precision-built. RUGGED. Handles BIG jobs. Complete line of accessories available. IS day FREE trial. Money back guarantee. Mail postcard for FREE CATALOG

RETAIL PRICE \$125.00 FACTORY TO YOU

\$7995

POWER TOOLS INC.

228 YATES AVENUE



baill Patss







ATLAS EQUIPMENT Co., Dept. PS-10 229 SW BLVD. KANSAS CITY, MO.

SHEET METAL BRAKES

From applies danges and fit shipped links 20 manufer stee beautiful
a use mare take to be for the said by bestee o breach of compad

to a beautiful
and the said to be to be to be to be

Signature of the said to be to be to be

Signature of the said to be to be to be

Signature of the said to be to be to be

Signature of the said to be to be to be

Signature of the said to be to be to be

Signature of the said to be to be to be

Signature of the said to be to be to be

Signature of the said to be to be to be

Signature of the said to be to

S Wide Phert from Socks 62 50

S Wide Phert from Socks 62 50

24 CURVE FORMER 2 to 1 14 pouge 2" to the 810 00 P.P.

IRON BENDER 122 capper v 1 parts At steel \$10.00 P.P.

VYKE BRANE CO 8 1144 So. 27th BL, Grants 5, Netr



Don't waste time and effort with old-fashioned methods of removing paint. Don't the fast modern WONDER-PANTE way Wonder Paste is a despection solvent applied with a paint brush. It softens up tough, thickly conted pain variable enamel lacquer shelise, etc. and forms a soft slidge that comes off clean. Does not run on unright surfaces. Lee it indoors or outdoors. Harinkes to hands or fabrics.

Get Wonder-Pasts - at point and hardware stores.

Wilson-Imperial Company, 121 Chestnet Street, Newark 5, N. 1.

Write for WONDER-PASTE leaflet



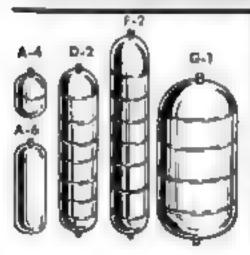
11 improved features . gives treer, smeether cuts ready for edga-gluing without additional finishing

Using a wedge-like cutting action similar to that of a plane or jointer, the new Pacific Salt. Gut gives cuts so smooth they're ready for gluing without additional finishing! "Kick back" and serious (nuries are almost eliminated because the cutting teeth (only 8 or 12) project on 20/1000" above the non-cutting edge. This makes it practically impossible for the blade to pick up the wood and hurl it back at the operator OTHER IMPORTANT ADVANTAGES... lewer teeth make resharpening easy... reduces noise and blade stalling ... operates on 30 % less power... teeth stay sharper longer because they're made from nickel chrome steel.

- OMM	year satti-Cut	MOM: -
Die.	8 tonth	12 teeth
6'4	\$3.60	
711	4.25	34 25
6"	4 29	4 69
10"	6.09	4.09

Specify arbor hole die. Send check or money erder to: WESTERN SAW MFR., INC., 1840 B West Washington Sive., Los Angeles 7 Agents and dealers wanted

Amazing Penmanent magnets—with not wearen nonexecutic lists are sund link a tools and other steel from from
like pate, pinting table drains or other hard-to reach spots stockde i.e. the stee from floor awaren as Clear at ey of harmist to ke
had a fiding other pass) after lays for itself on cky Gt (164NTF) or
Try any magnet me week Money refunded if you are not well pleased
Cal No () h line a pu t of 125 lbs on a fint stret black) \$10.50
Cat No 550 (15) b put \$5.50. Cal No 550 (501b, put) \$4.00
Cat No 550 1 b put \$5.50. Cal No 550 (501b, put) \$4.00
Cal No 550 1 b put \$5.50. Cal No 550 (501b, put) \$4.00
Cal No 550 1 b put \$5.50. Cal No 550 (501b, put) \$5.400
Cal No 550 1 b put \$5.50. Cal No 550 (501b, put) \$5.400
Cal No 550 1 b put \$5.50. Cal No 550 (501b, put) \$5.400
Cal No 550 1 b put \$5.50. Cal No 550 (501b, put) \$5.400
Cal No 550 1 b put \$5.50. Cal No 550 (501b, put) \$5.400
Cal No 550 1 b put \$5.50. Cal No 550 (501b, put) \$5.400
Cal No 550 1 b put \$5.50. Cal No 550 (501b, put) \$5.400
Cal No 550 1 b put \$5.50. Cal No 550 (501b, put) \$5.400
Cal No 550 1 b put \$5.50. Cal No 550 (501b, put) \$5.400
Cal No 550 1 b put \$5.50. Cal No 550 (501b, put) \$5.400
Cal No 500 1 b put \$5.50. Cal No 550 (501b, put) \$5.400
Cal No 500 1 b put \$5.50. Cal No 550 (501b, put) \$5.400
Cal No 500 1 b put \$5.50. Cal No 550 (501b, put) \$5.500
Cal No 500 1 b put \$5.50. Cal No 550 (501b, put) \$5.500
Cal No 500 1 b put \$5.500. Cal No 550 (501b, put) \$5.500
Cal No 500 1 b put \$5.500. Cal No 550 (501b, put) \$5.500
Cal No 500 1 b put \$5.500. Cal No 550 (501b, put) \$5.500
Cal No 500 1 b put \$5.500. Cal No 550 (501b, put) \$5.500
Cal No 500 1 b put \$5.500. Cal No 550 (501b, put) \$5.500
Cal No 500 1 b put \$5.500. Cal No 550 (501b, put) \$5.500
Cal No 500 1 b put \$5.500. Cal No 550 (501b, put) \$5.500
Cal No 500 1 b put \$5.500 1

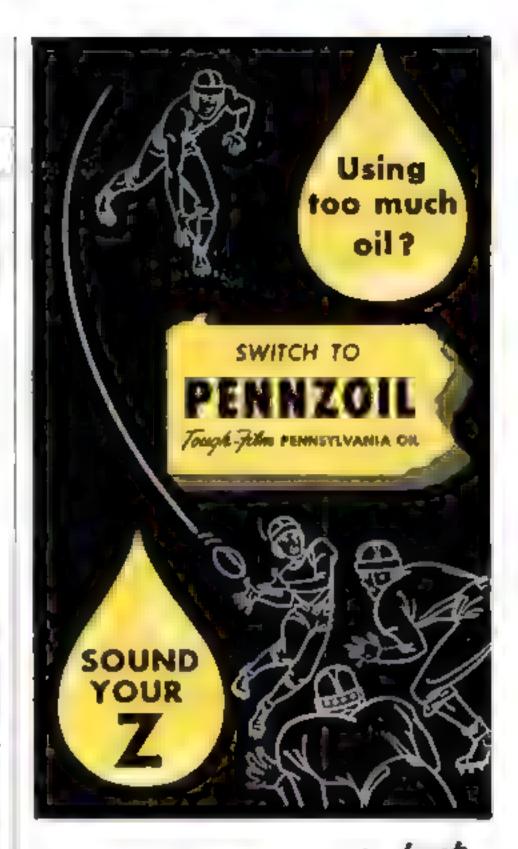


Steel pressure tanks suitable IUT urate gases hydroultes and Louida Rated at 500 the per standard pipe thread openings on tank ends as shown.

		9124	,	Lbs.	Volume	Price
A-4 Statement Steel	-46=	4 8	42.57	11 =	IDJ eg m.	S L 50
A-B Curtish Size	-24 pm	1 7 5	al y	27.6	234 CB B.	3 50
D. 2 Stanniese 4 cer	Nieur	27 4	16		airu eu. In.	
Di 28 Carting Steel	24 mile	24 %	6"		our eu. In,	
更多 Ston them Steel	· Night	15" 4	III.	1.1	Julius em dig.	
F-2A Cartian Size!	-34 EW	45" %	H-	1.1	1 = H CH H.	8 50
6.1 Sta niese Steel	-New	31" =	-4-11	18	film on in.	11 30
Q-14 Sta n'one Steet	T ned	24 L	T	II II	"Her ea. n	9 50

Prices F O B Chicago Include approx la adtanca C O D, orders enclose 25 % post ize on orders paid for balance sent C U.D

U. A. S. Corp. But PS-10 9837





You'll do better work with better tools

There's one point on which all mechanics agree—better tools mean better work. That's why you'll see these Stanley Tools in the tool chests of skilled woodworkers everywhere. Accuracy and easy driving action make these tools perfect partners for better boring. Buy where you see the famous Stanley trade mark. It's your assurance of better



The Tool Sox of The World



HARDWARE * TOOLS ELECTRIC TOOLS STEEL STRAPPING * STEE

i	SEND ME SERIES C
{ 	Stenley Tools, 4101 Elm St., New Britain, Com. (in Conade: Stanley Tool Co. of Conade, \$td., 4101 Stanley St., Raxion Fand, Quebec).
ļ	I want () Series C Early American Designs. Enclosed is 35c for each set.
1	Nome
ŀ	Street
ĺ	Gity

BIG NEW AUTO BOOK Shows You How To CUT Repair and Service Costs to RECORD LOW! Popular Science Experts Help You Put and Keep Your Car in Order! Now you can do something about today's high cost of car care and equate 'Hoir to Take Care of Your Car' shows how you can easily solve hundreds of car problems sourself' Bag hook is jammed with non-technical instructions, pactures showing you, a nonprofessional, how to Save on Gas, Oil,

Lires, Locate, Repair Car Troubles on Road,

at Home and much nure!



AND MONEY All you to be morely detach toupon below and ma in or a book week a ERFF true Bolance of edition geomy (ast he may mover again be able to offer took at low bargain price of \$1.95. Paste Compant to priors posteard mate 19914).

1111 70 11111
1 1 1 1 1
Please send 'HOW TO TAKE CARE OF YOU'R CAR
in edition checked below. I will pay postman price pius
postal fees. If not satisfied, I may return book within 7
days for refund of pur base note
De Luxe Edit on bound in ifetime Buckram;
this stamped in gold Only 2,48.
Name
Add ess
City State State
Check here if you remit now, We will pay
all shipping costs. Same return nervilege







BRONZE FOUNDRY

Schools and Home Workshops
Make your own castings of algot
num copper broaze silver Foundry
sets are available in three sizes in
clading 24 to Deg. 4. blost Fornaces,
\$22.36., \$29.30., and \$42.90., f.o.b.,
Kansas City. Free Circular

KANSAS CITY SPECIALTIES CO. P. Q. BOX BOX2. DEPT \$-10



doing repair work for yourself and others. Repair men, farmers, trasmiths, home and auto owners, hobbyists, etc., say FOUR WAY pays for itself over and over Order today or send for Free details.

FOUR-WAY WELDER COMPANY, Dept. FE-KB 2326 So. Michigan Ave. . Chicago 16. Illinois ORDER NOW RED DAY TRIAL



A mucked-up

oil filter can cost you

plenty in engine repairs.

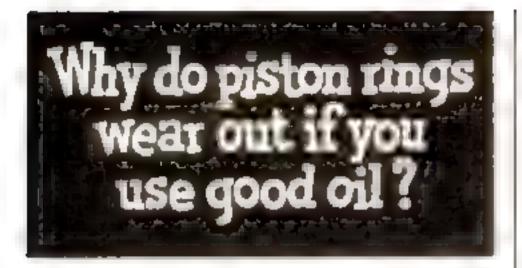
Get in a new Purolator* Refill—quick!

Hard to believe—but true! A filter may collect over 2 pounds of engine-wrecking muck out of your motor's oil stream. It gets clogged in time—can't keep up its motor-saving . . . dollar-saving work.

What to do? Don't delay—get in a clean filter refill—fast. Which make? Pays to buy the best—a Purolator Micronic. New accordion-type design gives up to 10 times the filtering area—with porce so tiny they trap particles you can't even see. Cost much? Strictly small change—\$1.38 to \$3.00 depending on car make. Purolator Products, Inc., Rahway, N. J.; Toronto, Ontario, Canada.



Right you are—it's JOE E. BROWN co-starred in "SHOW BOAT," on M-G-M Picture. Color by Technicolor.

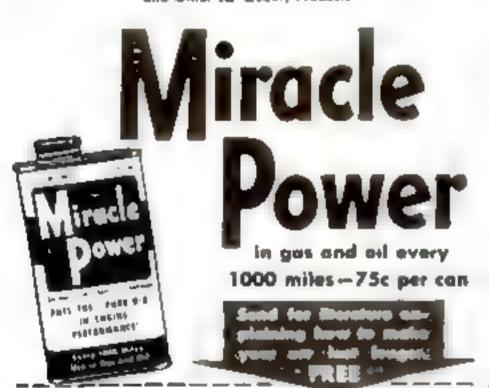


If your piston rings were always protected by oil, they'd last longer. Unfortunately, when you start your car after long stops, it takes up to five minutes for oil to reach all vital parts, Meanwhile, dry metal grinds against dry metal. This DRY STARTING forms "Metal Ulcers" . . . causes most engine wear.

To stop it, use Miracle Power in your gas and oil. The colloidal synthetic graphite in Miracle Power clings to rings and cylinder walls . . . lubricares them until oil arrives. Actual tests show 49% less piston ring wear. Result-longer engine life . . . more power . . . more miles per gallon because of freer movement of parts. Next time you get gas, get Miracle Power.

Miracle Power Division THE APPARTS CORPORATION . TOLEDO, ONIO

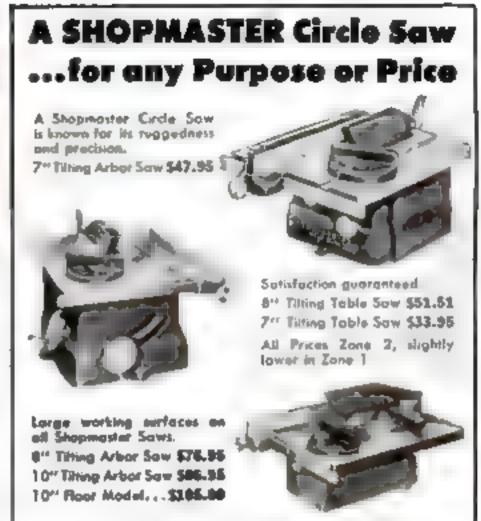
> Manufacturers of AP Milesge Galling Mufflers and Other RF Quelty Products



THE AP PARTS CORPORATION 1072 AP Building, Tolade 1, Ohio

- Please send me FREE literature on making my car last longer.
- I want to prove the benefits of Miracle Power myself Enclosed is check or money order for \$1.50 Please send me 2 trial containers of Miracle Power postpard.

NAME	
ADDRESS	
CITY	ZONESTATE



Write today for catalog of COAPLETE line

SHOPMASTER, INC.

1214 Third Street South • Minneapolis 15, Minneapole

ELECTRIC SHEAR SHARPENER Over 75,000 Sold-It Must Be Good!

Genutee Carbarandum when ten for shop or table with morder and shipment wil be made at three treps d to your door subsets we calco trical goods datainage

WILLIAM MARVY COMPANY, Dept. 12 479 St. Petre Street St. Paul 2, Month

S FREE COURSE! BIG PROFITS! S Flocks & Sandblasts

Deal Purpose Spray Gue! Uses eaty 25 lbs, Air Pressure! * Thousand on of uses in Hume, ohop, Industry Makes Agin incertors Clean & New L. new rest. Marrer of any bases Reflect as Frust with the planets of Removes Patrick and from the planets of Susranteed Bend \$24.75 or write for free information. Complete Flocking Supplies:

BLASTO SPRAY OUN MFG. Copt. PS-2, 7007 Heat Ave., Las Angeles 47, Calif.





Send for the NEW 96 page Red Devil catalog No. 21

Address Dept. P.S.

BEVAL TOOLS, IRVINGTON 11, M. J., W. &



ENGINEERED — Not Packed

YET COSTS LESS THAN MOST HOLLYWOOD MUFFLERS!

The Dynatone has guts! It's the only special muffler engineered for your car You'll go for its deep, meliow tone—and you'll go for these features, too -

- Lower back pressure.
- More power.
- More gas mileage
- Longer Life
- No tinny vibrations

Listen to a phonograph recording of the Dynatone at vour automotive dealer. Or write us for the name of your nearest dealer.

Toledo 1, Ohio





TURN YOUR CAR INTO A COMFORTABLE BED

You can MAKE CONVERSION QUICKLY & EASILY

With Easy-to-follow CAR BED PLANS



Ideal for **HUNTERS.** FISHERMEN VACATIONERS and ON OVERNIGHT TRIPS

Use your auto as private sleeping car and save money; Test IB solid comfort

WORKS ON 2 and 4-DOOR SEDANS CLUB COUPES & CONVERTIBLES

GUARANTEED TO WORK

enly

for complete plans and instructions

NO INSTALLATION CHARGES!-With Car Bed plans and instructions. you do converting yourself in spare time. Get necessary parts locally for less than \$3.00. Give make, model, and whether 2 or 4-door, ACT NOW! Send check or money order

Install a RADIO SPEAKER IN YOUR BACK SEAT

Insures listening pleasure for back-gent riders. Fita any car.

GUARANTEED-

We send 5" speaker, control switch, and comonly plets plans Анупла сал 095 installt

Keep Bugs Out-Now! - Screens For Your Car Doors —

They be snugly on outside of door . . keep out mosquitos and other insects. Fits any car Send make and model. Guaranteed Satisfaction or Your Money Back!

> Set for 2-doors

Set for 4-doors

Dealer Inquiries Inveted

ORDER TODAY!-No COD's please! Shipped Postpaid. Bend check or money order

> AUTO BED COMPANY

305 East oth St.

Panama City, Florida

USE KESTER METAL MENDER

FREE: "Soldering Simplified." 16 page Illustrated booklet. Get your copy now.

Kester Solder Company 4254 Wrightwood Ave. Chicago 39, Illinois



MOWER

FOR LAWN MOWER SHOPS GOLF COURSES . PARKS

101 OTHER JOSS

OCCE

HOW

Balimpry

Sharment All Reet Type Mowers & Hand Power or Bang & 10 to 20 Ministra & He Diamenting & Ho Extra Attachments Heedre.

reel type mawers from 5 inch. ters to 36 inch power mowers. are quickly sharpened to extreme and soft left and right two-

maig in place when sharpen ng to n process Bed knife is sharpened in same prackets Gr using head rides on five tall bearing races East to operate.

t so sharpers chinely paints

Links p aner Mades Big profit maker Own your own

Sustances Send Today for FREE Histories Building

No. 11-C1 Prices subtent to Change Without Notice, واوا إرجمه

MODERN MEG. CO. LAG N. FAIR DAKS AVE

BUILD ARCEWELDED FROM OLD WE SHOW YOU HOW

Light or Heavy Work Produces 75 200 amperes. Takes no presious experience of furd work

to make one of these welders. Com piete plant 35e stend for your PLAMS rodes and well include FIRE our is a NEW Unidog list ing hundreds of electrical bargaton

LEJAY MFG., 1323 LEJAY BLDG., MINNEAPOLIS, MINN.



PRICE

741**m** tess motor

5263**m**

wath

Take BELSAW Portable Sawmill right to the trees turn out valuable lumber for local erds—do costom sawing for heighbors
BELSAW lasts a lifetime Nocrew needed,
Power with old soto engine. Beginners get exceljent results Send postcard for FREE BOOK,
"How To Make Lumber"

RELSAW MACHINERY CO \$463 Flold Mdg. Kanous City S. Mo.

DRAINS Cellars, Laundry Tubs; CIRCULATES Oil; IRRIGATES Gardons

Original Type P" Pump has 2400 GPH capacity 360 GPH 15 high or 1500 GPH from 25 well Use any 's to 's HP motor DOES NOT CLOG

Only 86 95 postpaid if each with ntder (West of Missunipp) add 500 1 SATISFACT ON A MUNICIPED OF MONEY BACK

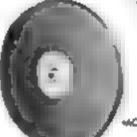
LABAWCO PUMPS, BELLE MEAD 3, N. J.

Wood-Turning Tools OUTLASTS STEEL SO TO 111

These percentably limit tipped with Ti V NTS CALLE L. with national on with the r performance. The amort 1965 F HASD engal) well in word place c as an ordinament of the amort time bold their trains the rise almost addition and desire to train the feed almost addition of the state they will first word or pushing for days and days to NTS to the state price Regulated to District first that their trains postable in the first trains and percent postable in the first trains and percent postable in the first trains and percent trains and first trains and the first trains and percent to the state of the

Inch Dis

CHOICE OF 16, % or 14" ARBOR HOLE



SAND ANGLES SQUARES CITCLES, ETC. ON TOUT CITCULAR SAW DISC COMES COMPLETE WITH FINE & COAPSE PAPER ALMEADY APPLIED ON OPPOSITE SIDES.

80f

EXTRA SANDPAPER TO FIT DISCS ASSORTMENT OF \$ GRITS

MONEY BACK GUARANTEE & SEND EHECK OR MONEY ORDER

WRITE POR CATALOG No. 5-10

JAXON COMPANY-369 ELLICOTT ST. - BUFFALO 3, N.Y.

INTERNATIONAL PROPERTY OF THE PROPERTY OF THE



DRILL, SAW REAM metal, pipe, wood, plastic. Transite etc. the with any electric drill now drill press, (othe or milling mochine Drills awn storting hole—upper part of bit is used to sut tow or ream circles, ovals, squares or scrells. Easy to operate deat for corporators, mechanics, electricians, plumbers, hobby lits, many others. Abrosine resistant, high speed steel. Fluten ground from solid. Will withstand severe continuous use without breaking Restaupened or no charge Takes place of up to 350 to rook. It diameter, 2" cutting sections, total length 25." Abay available specially designed for wood or metal and in 22" and

19' lengths. Write for details Specify allpurpose bit Shipped same day Money-back guarantes Dealer inquiries invited SEND CASH, CHECK OR MONEY ORDER

Manufactured and distributed by INTERNATIONAL TWIST DRILL CORP. 434 Wyondows, Rm. 494, Kentus City 4 Me.





SHIP MODEL

New foods chose hose to make any more! Shows the chost cuts binks, tone caring methods of experts. Come steep and for gorseous galleon copper ship etc. Almost 100 laustrations. Full cloth bound \$100 Pappier Science Marchly, Dapt 1051, 353 Foorth Ave., New York 10, M. Y.

New Accurate 10" SLIDE Rule



When Writing to Advertisers, Mention Popular Science



NO FROZEN PIPES

When You Use WRAP ON ELECTRIC HEATING CABLE Protects to 35" Below Zero

No more worry expense or inconvenience from frozen pipes, Just wrap plantic conted d or shallow underground pipes and plus

eable around exposed or shallow underground pipes and plus into 115 volt outlet. Maintains low heat—like electric blanket. Uses only small current. Thermostal turns on only when needed No radio or TV interference. Low prices—complete with connections—from one dollar Satisfaction or money back.

E-Z-WRAF Fipe Insulation, Thick blanket of glass fibres. Vapor coal wrapping. Conserves beet. Gives greater projection. Easy to

E-Z-WRAF Fips Insulation. Thick blanket of glass fibres. Vapor seal wrapping. Conserves heat. Gives greater protection. Easy to apply Stops drip from cold pipes in hot humid weather Saves host on hot water pipes, \$1.00 per package, Covers 17 ft. 15" pipe Write for full information and free catalog.

CLYDE J. SMITH CO.

11141-7 Morang Ave., Detroit 24, Mich.





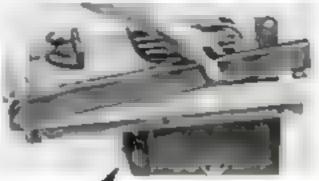
Zip through a board with this Power King and you'll know you've picked the saw for your shop! Everything about it — big precision ground table, ball bearings, tilting blade, exclusive rip fence — combines to add to your craftsmanship, save you time. It's big enough to help you build a home, remodel rooms, make large futniture — yet smooth and accurate enough for the finest hobby work. See it at your Power King dealer's today, or send postcard for complete catalog of all 8 Power King tools.

OUTSTANDING FEATURES

- Till/Arber, Ball Bearing Construction!
- 11½" Table Surface Ahead of Blade on 1" cut1
- 3%" Depth of Cut
- 16" = 20" Toble, 34" g 20" with 2 Extensions!
- · Finest Rip Fense of All !



Table and work stay flat for angle cuts. Safer —more occurates



Fence locks at both ends. Lifts off easily, positions instantly!

Itlas ATLAS PRESS CO.

1042 N. PITCHER ST. . KALAMAZOO, MICH.

OCTOBER 1951 291



E KW Paht. 120 vote. d0 cycle AC List today \$.010 00 Used \$675 00 NEW Your price only

\$895.00

BARGAIN SPECIALS !!

But Bearing Arthur 54 55
Alarin Stren of Horn 515 65
Minimally Magazine 56 55
Electric Hor Wayse Horn 15 24 56
Mint had be are represented 50 56
Mint had be are represented 50 56
Con All has at \$1.71 56
Cont \$15 M Daily \$22 00
Asceraft henter 5 6 5
Other mass 4 5 to 515
Other mass 4 5 to 515

2500 Wath to Sightly used but received the parties of 1911 y \$255 Or 1915 Waters of 1911 y \$255 Or 1915 Waters of 190 with the 40 TO MATIC bettere parter \$465 OR 195 Water \$10 20 with the 40 TO Matic bettere parter \$465 OR 195 \$240 OR 196 Water \$10 00 Matic \$10 00

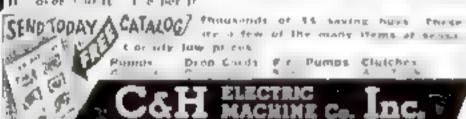
therefore the property of the second transfer of the second transfer

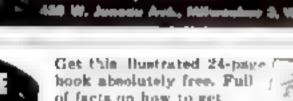
SENSATIONAL WINCH VALUES



For—Contractors, Boats,
Formura, Trucks, Lagors, etc.
WINCHES Not to capacity
if in security 3 8 50
WINCHES I THIS ID. Capacity
if a princet \$29.50
WINCHES TO ID capacity.
II to these \$39.50
WINCHES TO ID doubt a
draw Stort operated \$49.50

WINCHES A 5-10 to ea settly Planting with a 5-00-50 WINCHES A 1-14 to a 7-14 blanting with a 5-00-50 CASLE, the formal set in the steel are fall 1-10 ft or law 17c per ft ox 65 1 m ft to per ft.





Paintine

Get this flustrated 24-page book absolutely free. Full of facts on how to get better results with aluminum paint—which type to use for different jobs. Absolutely no obligation—just write:

ALUMINUM COMPANY OF AMERICA 1717K BULF BLOG., PITTSBURGH 19, PA.



DRILL PRESS OWNERS!

HERE'S 1 TOOL WITH 5 DISTINCT USES

THE BARRON MULTI-PURPOSE ROTARY WOOD PLANER

PLANER & SURPACES - PARELS & BEASS \$ 750
ROUTS & GROOVES - RABBETS - TERONS
Placed precision performance—containty of skilled workshan-

ship—time-saving, money saving short cuts—yours with world famous Surron Orill Press Tools. Fifteen important operations—all systable on any standard drift press—with Sarron Accessories. Equip your shop with these versaille exclusively designed tools—and save up to \$500, 200,000 Sarron owners have bought on our liberal 10 day full money back guarantee. Order or write for catalog.

BARRON TOOL CO. INC.

266 Architects Bldg., Betreit 1, Mich.



WELD IT YOURSELF

Weld, Cut, Braze, Solder IRON, STEEL, BRONZE, BRASS, ALUMINUM & OTHER METALS

Tool and Equipment breakdowns are always annoying and costly Doo's let them bother you Get a Dynamic Art Welder. You can do expert work on your very first job Welders oper ate from any properly wired 110 V AC line. The handless "sool in your workshop. A Dynamic Welder will have stallow cost over and over again to have and money.

DYMAMIC INDUSTRIAL type transformer Arc Walder 75 amp output for Industrial or Werbshop use.

DYNAMIC WELDER CO. Dept. D3 KM of E 25-d 20 Dh ise 15 40

Free Datails and "How to Wald"



Everything

YOU MEED

Das am price

caup to use

he verid allen

Shire Money Buy

day mener back

TO AP ME PREE

ME YOUR
MEIGHORHOOD
WOOD EXPERT
A MUST FOR
HOME CRAFTIMEN
MODEYISTS!

The only wood sample kit on the market Contains 54 specimens, 84 page identified manual with 51 magnified cross sections, 10x hand lens and knife, and directions list 20 experiments. Delivered anywhose in continental U.S. All for only \$8.50 postpaid.

TIMALY THE PRINCIPLE OF THE ST., N.W., Washington 6, D. C. (Pu)

MAKE \$25 to \$50 A DAY

Installing the Amazing New

REDI-WARM

AUTOMATIC ENGINE TENDER

The most widely publicized auto accessory on the market today. Redi-Warm insures instant starting, regardless of weather conditions. Consists of three simple units that can be easily installed on any type of car. No technical experience necessary. We show you how to do it, and how to make the biggest week's pay you ever dreamed of Write or wire for territory reservation.

CRAY-LINCOLN ENG. & MFG. CO. Cray Oil Bidg. No. Walpole, N. H

WOODCARVING and WHITTLING AN ARTISTIC HOBBY FOR ALL

This new manual shows you how to do every kind of wood carving. How to carve jewel boxes, picture frames, trays, chests, furniture, etc. How to do chip carving, level surface carving, incising, carving in relief. Carving human and animal figures in the round completely explained and simplified. 256 Pages. Fully illustrated,—full cloth bound. Send only \$2.00 and your copy will be sent postpaid, or order COD plus postage if you wish.

Money back if not satisfied.

Popular Science Monthly—Dept. 1051
353-4th Ave. New York, N. Y.

Build It, Fix It





"It stays stucki"

Dries entirely by evaporation of the solvent, Quick settingno distortion, Ideal for asrepairing, sembling, crafts, electrical work, factory, werkshop or household use. Send postcord for free literature.

Try Ambroid in your business, too. For over 40 years recognized as the leading industrial adhesive of its type.

- Ready-to-use
- Fost drying
- High tensile strength
- Transparent
- Waterproof

Art galleries, museums, and leading industrial concerns, rely on AMSROID

Try a tube today.

At most hardware stores and hobby shops, if your dealer cannot supply you, send 25c for big 2 sz. tube, postpaid. Money back guarantee.

AMBROID

BOSTON 10, MASS.

1951 KING MIDGE

WORLD'S LOWEST PRICED 2 PASSENGER CAR In he it for 75r per work Amount performance furnescopy comfort All sleet construct of Full appropriates top and heater Buerty to ran or assemble it the per hot topother



NOW-40 different CUTS with



DADO LAWING WASHERS On Your Saw Blade

Just dial widths to cut parallel grooves perfectly amooth. No warp, vibration

or trick screws. Strengthens blade, perfect balance. GUARANTEED! At your dealer's or order direct. Give arbor size-1/2", 1/4", 1/4", 1".

Send for free booklet

WARREN WASHERS COMPANY 70 Medbury, Detroit 2, Michigan



A \$245.00 WORKSHOP COMPLETE FOR OMLY \$94.75"-BUILT WITH MY

SKIL Home Shop Tooks

My workshop is the envy of the neighborhood, and I built it by myself with my SKIL Home Shop Saw and Table, cutting building costs more than half! I paid only for materials.

I'm no great shakes as a corpenter, but with SKIL-Chart #106 as a guide it was a cinch to

build this shop in spare time.

My SKIL Home Shop Saw has plenty of reserve power. It is easily converted to a tilting arbor table saw with my SKIL Saw Table. It miters, bevels, cross cuts and rips with complete accuracy!

You'd be surprised at the number of things you can build for the house with SKIL Home Shop Toole! When friends visit my workshop I love to show 'em how these tools can pay for themselves with the money they save!



SKIL Home Shop Saw-Model 520 Tost. accurate, powerful 6" saw. Full adjustments for bevel and depth of cut. Nolood speed; 5800 r p.m. Automotic blade guard. Overall (ength: 101/411). Weight: 101/2 pounds, \$39.50,

Prices subject to change without notice. "For moterials on v. Local prices vary



Mode only by Skilenw, Inc. Ch-cage 30, a)l.

In Canada: Skilleols, Ltd., 3601 Dundos Street West, Totanto 9, Ont

Skilsow,	Inc.,	Dept.	9-101		
5033 Elsa	on As	m., Ch	Hage	30,	110.

FREE: SKIL-Chart No. 106 shows you how to buy mate. right and build the workshop shown above.

Name.		
Street		

Skate.

Rustproof Metal!

KRYLON-12e

home and gorden tools—fishing rads and other sports equipment—nailheads and scrowbeads — children's playground equipment — lawn furniture—acreens—hundreds of other objects!



ACRYLIC conting that scale out water, air, moisture, dirt. Just press the button on the aerosol can and spray Krylon on. That's all there is to it! Krylon won't change color, crack or dry out. Waterproof, non-flammable. There's absolutely nothing like Krylon. It's America's Acrylic spray. Spray Krylon on almost any paper, leather, wood or metal surface. Protects, preserves, beautifies, "KRYLON-IZE" leather bags and luggage, valuable papers, photographs, washable walls, etc., etc. Hundreds of uses in every home! At hardware and point counters everywhere in the big 12 os, serosol spray can.

KRYEON is also available in ALUMINUM and BRIGHT WHITE All the qualities of clear Krylon, plus brilliant color. Go farther, last longer, clean easier, easier to apply than paint or enamel. Big 12 on seroed spray cans.

KRYLON, INC. 2401 N. Broad St. Philadelphia 32, Po.

Say "KRYLON" at Your Hardware Counter



QUICK-ON, STAY-ON, SPEED NUTS® NOW IN HANDY TINKER KIT

SPEID NUTS - famous throughout industry-now tendy for home use. Ideal for repairing or attaching sheet metal parts

on toys, appliances, etc. Kit conpains over 100 parts-10 popular sire nuts and matching screws. Replace threaded auts and lock washers this fast, sure way. Tinnerman Products, Inc., Dept. 13(A), Cleveland 1, Ohio.





ORDER FROM YOUR DEALER

PETERSEN MFG. CO., Dopt. P-10, DaWitt, Nobr.

MELTING FORGING FIRING



Do your own MARIANING TEMPS ING ANNEAS IN BEAZIN HENDING ANSASS. PROGRESS HARDN CASTING FAIL
IN COLOURS STORMS AND CAMPINES FAIL
INCOME COME STORMS AND CAMPINES OF THE ANALYSIS FAIL
Burner come esta become all and a 2 fee of the a recombat
as flow From a common function as a recombat
for the 12 fee of the annual compact (a trade on t reads
for the area of the annual compact (a trade on t reads
for the area of the annual compact (a trade on t reads
for the area of the

cy les. Waste for exemptete informs ion. Tell us your requirements. Im-med are do see. Price ERU St. FUR factory. But startion gage.

STOODARD PRODUCTS CO., Inc., 66 Amily Rood, New Haven 15, Cons.

AMAZING 32 .- IN. PLANER Does All Ordinary Planing
Mill John. Provides attachments for Jointing,
Rabbeting Tougue Groove, Matching 121, 2 cin capac y 1 to 70 solid round at steel cut
or lead Tower feeds at 31 feet per minute. It
of aperiach Travides for fal line of accessory
attachments levind and Join interes IN TICE
DETERMINEA WITHOUT TRICE TYPING BELEAW MACHINERY CO LOZE Field Eldg., 315 Westport Rd., Kansas City 2, Mo.



Hold, stort and set up acrews in unhandy places. Gripper instantly released by SPRING ACTION, sliding up out of way when not in use Highest quality throughout

Hem Models FOR RECESSED HEAD SCREWS

UPSON BROS., INC., ROCHESTER 4, N.Y



At Londing Doulers Everywhere

RPLUS MACHINE SHOP TOOLS

HIGH SPEED STRAIGHT SHANK DRIELS SET 10 0 fferent Scan H S. Birnight Shank. Johner Length Brills, 12" in 13", (shank same die an drill) | 42 02

SPEED DRILLS

to ½" with ¼" Shanks to 1" with 1/2" Shariks

SET & Different Size # 8, 357 Drills, 1/4" to 1/2" all 357 with 1/4" \$2.50 **\$3.50** thanks

SET IN HE \$4.95 36T above But 35 . and 367 will dt any %" drill.

SET & D flerunt files # 4, 327 Drills, 19" to \$6.95 I" with 19" shanks \$6.95

at only .

ger 10 Defferent Bire H & Dellin, 97" to I" with 97" shorks

These it 8 provision driffs with 1/2" shanks can be used in a 1/2" electric driff or a 1/2" capacity fathe or still gross.

HIGH SPEED MORSE TAPER SHANK DRILLS SET 20 Different Size High TOT Speed Merse Toper

Short Deltle from 1/4" to 1" \$70 Value. Priced #1\$12.95

SET i Gifferent Bire 157 High Speed Morse Taper Shank Drills fram 114", 150 Value. Priced \$9.95

SET & Different State High Speed Morto 377 With No. 3, 4, and 5 to \$29.95 pers, \$128 Value, Priced at only \$29.95

HIGH SPEED HAND TAPS

SET & Differ-17 cal Bire High Speed Standard Thread Hand Taps up to

aluding 2 and. High Speed Pape Tape \$2.95

407 IS same as above.

HIGH SPEED TAPER SHANK CHUCKING REAMERS

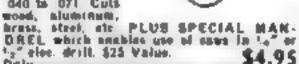
SET 15 Different Stee High 757 Speed Morse Taxor Bhank Chucking Reamers up in 19" pers. Priced at only \$6.95

137 Speed Moras Tagar Blank Chucking Reamors from 1," in 1" 44 95 \$4.95 Priced at unly.

10 Different files High Speed Marse 127 Taper Shack Chucking Reamure from \$2" to 1's" \$55.00 value, Priced \$9.95 at only

Slitting Saws with Mandrel

@ Dofferunt 347 Bire H gh Speed SI 1ting Saus, 25, 1 1" pr bur Thickness from 040 to 071 Cuts



NIGH SPEED

COMBINATION DRILL AND COUNTERSINKS

SE4 8 eriected bites from C2 to F2
2T drill a 7 16 body) 60 degree angle
of countersials New toat on those countersials, 75c to \$2.50 when avail
able, 75c price for set of 8, only \$4.95

Righ Spead Straight Flute Expansion Resmars MEW reamers now in stack, Size B 17/32 to 19 32 D-21 32 to 23 32 E-23 32 to 25 32 Mig by Gleveland Twist Delli Price on any one of above three \$3,25

NEW MOUNTED STORES SETMILITURE OF 12 27Twith 62 00 14 shanks \$2.95 SET 34 Above \$4.85

PIA PESCO PUMP gear type, dis-pracement 114 OPM at 1500 PSI Continueus operating speed 3750 RPM, Pump

is driven by har \$9.49 Spline Diston

Brand New Pump AND MOTOR

Pemp bas L' connections, built in retief able up to 1500

the Idds, car
sacrity 6 GPM 14's M P , 24'
voit moter, 4000 RPM Can
be used on 12 or 36 voits.
300 units available at quantity dis-\$13.95 TULSA reports Both pump

Money Back Guaranter—All adds, Minture of New and Reconditioned Tools Unless Specified Brand New—All Orders (Except Those Specified F 0.8, Tutsa) Are Shipped Post Paid, saving you up to 25 %, on total delivered cost

Write for Free Calalog Oreceibing Thousands of Bar-gainCuttingTools. T. TOOL 221 W. SECOND



Favorite of home owners and craftsmen for 20 years' SPEED'T SPRAYER gives your work that professional paint botsh everyone admires. Sprays paint, enamel, . 4 to 7 times varnish, lacques, etc. faster than hand brushing! Lightweight.

portable, uses any 4 H P motor Improved diaphragm print ple assures clean, oil free air You It find dozens of time and money saving uses for SPEED'S SPRAYER, including spraying insecucides 2 4 D and DDT Complete outfit, without motor, only \$32,50.

At leading bardware, lumber, and auto supply dealers. FREE-write for handy booklet "How to Spray.

W. R. BROWN CORPORATION

2637 N. Normondy Ave. • Chicago 39, III.



144 PAGES OUICK DELIVERY

on maple, poyter mak, tonhorany ordar, cherry, walnut, and many othersall property seasoned and kiln, dried.

MAIL THIS COUPON--TODAY!

this big, new cotaleg Contains everything wood craftsmon needs.

Shows 32 rere and fancy woods

in color 43 veneer designs. 275

scraft patterns, multicaler Inlava.

everlays, bondings all kinds of

tools, muchinary, calcust hardware,

ernaments, mouldings and pages

of volvoble lips, ideas, informa-

tion, instruction. Send for your

copy NOW, Only 15c.

CRAFTSMAN WOOD SERVICE CO.

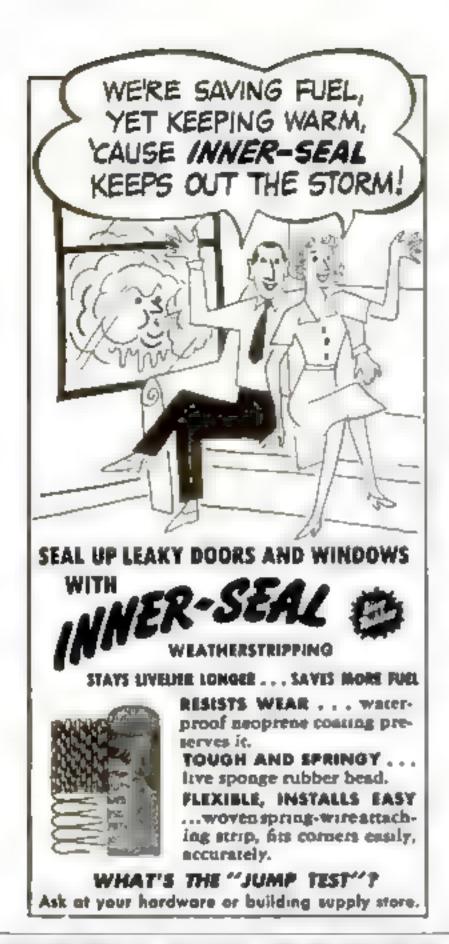
Zene_

2729 S. Mary St., Dept. B-10 Chicago 8, Illinois

Send me the big, new, mency-soving Catalog No. 12,

Exclosed is 15c. Name_

Address





INCLUDES

Commine 1/4" Electric Brills Com-mon Sow Attachments Combination Saw Blades Set of Brills Lambs Mari Bunnet; & Sanding Discu; Steel Arbor and Attechments: Clath Bulfine Wheels; Grending Wheel; Wire Wheel Bruth; Steat Paint Mirac; Stool Bench Stand, Portable Steel Corrying LOSS.

Price of Dynamic Power Tool Combination complete is \$26.95



only 2 95

Balance \$4.00 per month for & months.

<u>MO INTEREST OR CARRYING</u> CHARGES ADDED

KAPNER HARDWARE, INC. Dept. 8-7 2248, Second Ave., N. Y. 29, N. Y.

STOPS LEAKS PERMANENTLY

Cm your fixture replacement water and fuel the goar acture replacement water and fuel bits with Economy Renewable Seals Make economical permanent repart quick y and easily with the Junior k.q. i as Hepar temproom & schen and sandra fix ures Every hing you need in uded in stery box. The the hardran for he fixed whose per easts income from making permanen repart on their rustomers fourcets senter Master Kits and analysis respectively.

JUNIOR KIT, only \$22.50 the I want of Bearingto Seate Loss than the cost gint Agince.



ECONOMY VALVE SEAT CO.

1426 N. Keating Ave., Chicago, III.

SAYE TIME WORK MONEY

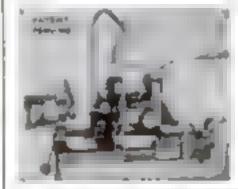
These sugged watking or riding trac-tors are ideal for farm, truck garden. FREE Illustrated cutalog giving complate details, price lists - write today

SHAW

POR PARM OR SARDEM WALHING OR MIDING TYPE



5718 Front St., Gulesburg, Ka 668PS North 4th St., Columbus.



Start a NEW BUSINESS!

ar Add to your present Names - Hardwest

SHARPEN DULL PIPE WRENCHES

PIPE TAPE & DIES "GUM" DIRCULAR BAWS

Write for Information J. C. MOORE INDUSTRIES SOI 8 276, Prodonis, PA.

only Raticed printing I knowngrav-

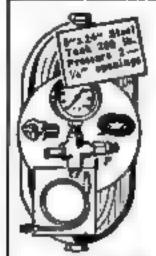
 ${f Print Your Own}$ Lurus, Stationery Advertising, titles church work tage atc Base money Sold direct from factory

> too. Print for Others, Good Profit. Have a home print thop Easy rules supplied. Pays for thelf la a snort time. Write for free catblog of outfits and all details. PRESSES, N-33, Meriden, Conn.



ONLY EQ.95 FREIGHT

WE SEND YOU A LATHE-NOT LITERATURE To Prave by Trial the Higgest Lathe Value Ever Offered The verged about other latter seen a transite for our photos he you can't more one 2 think with seen a transite for with seen you i teratore but we will seen you a mand new coping to be with seen you a mand new coping to be for with paid we let you are our taker for it acting to marking with the create and return it for the coincer And what a salke I is "Stand's to be with bed may much ned with don to V to 90°. The command units a 38's on a center public and to neked with 2 The command units a 38's cone enter public and to neked with 2 The command units a 38's cone enter public and to neked with 2 The command units a 38's cone enter public and to neked with 2 The latter may be operated with a 3 by 1 till right come. Bed enter 28' with city trace enter 6's an art Sent combined with hand underestive and ever care feed to the 1 face place and don The latter to precision and stand. Sent in answer even on and or would job within it is different action on I face to increase the latter of the sale of the s HAMILTON PRODUCTS, INC., 12416 Euclid Ave., Cleveland 6, Ohio



WELLWORTH AIR COMPRESSOR

Compressor has 2° bore, 1°4° stroke, 28 cfm up to 150 lb pressure. Motor required 14 h p at 100 lbs., 15 h p at 125 lbs. 1°2 b p at 150 lbs or equivalent gas engine. V belt drive, intake muffler and ceaner, brunze bearings, speach lubrication. Wt 16 \$20.50 lbs Replacement parts

always available

COMPLETE OUTFIT. Compressor, pressure tank, air gauge, sir chack. 20 ft, hose pop valve, copper tubing with 4 braze flared fittings for connecting compressor to tank, 4 way cross and 3 n.pples. COMPLETE

Equipment less compressor \$12.45

New Equipment

AUTOMATIC COMPRESSOR

1/4 RP heavy duty capacitor motor AC 110/220 volt 60 cycle, 2x13, inch piaton type compressor, splesh feed jubication, 12x24 inch tank, automatic pressure switch CFM 28 at 100 ib. pressure, or 150 lbs pres-sure for intermittent duty Check valve safety valve air regulator with gauge and filter, 20 ft air hose with air chuck for inflating tires. V bett drive Mounted on 2 wheels, ball bearing, with 2"x10" sem programatic tires Portable with handle. Shipping wt. 90 lbs.

With 34 hp me \$98.50 tor \$100 Value. With 43 h.p \$109.50 motor

Compressor \$20.50 only

\$79.50 Motor...... With 112 h.p. \$1 24.50 gas engine ...

Regulating gauge \$8.95 es.

1/12 H.P. MOTOR



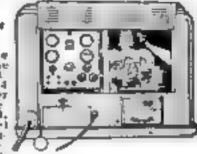
Delco 110-Y 60 cy A C | phase 1750 f P D 2 ainge 44 111 take 30% proriond Meany duty h Heavy dury high net d' long 5" high net brome WE 33 \$21 DO. \$60CIAL \$ 13.50

Lets of 3, \$12.50

LIGHT PLANTS

Brand Howl Signal Curps Power

Bais PE 197 115 volt 60 cycle A.C. single phase 5 K.W. Habart 5 R. W. Hobert water cooled 14 b p. 4 cyclinder Rercules engine Control. Bemote complete Danci board with Instru-ments 150 ft au-lumatir remoir con



trul cable with reel 150 R #8 beavy duty wire with reel housed in metal case with reels a one worth \$400 Regular Proce of unit \$100 Regular \$895.00 wt 1230 lbs. Our price competer.

Red Seal Continental Gas Engine BRAND NEW. 11, HP with 6 to 1 reduc-

tion gear Operates at 450 R P M For laws mowers. scooters, garden tractors pumps compressors, gen erators, etc List Price \$79 50, Shipping weight 54 lbs. \$47.50 SPECIAL PRICE

GENERATORS

200 to 75t watt A C 110 130 volt 00 cycle 1 phase output Also 100 watt D. C hatter; charging out out May be used at the shoot time toltmeter 2 outlet larges Wil 55 lbs \$99.50

Purnished with 11s HP



CLUTCH WELLWORTH V-BELT



Takes starting load off engines of motors. When appeal is reached a flip of handle shifts clutch from lding to determ position. Handles A bot's 3.15° pitch diameter in bot's 1.15° pitch diameter in bote tractors have with lawn movers garden tractors have withhop motors are illa long sale car to mount sented bronze marings at 2.50° sale car to supply at 3.16° \$7.50° same clutch summitted with in the control so.16° sale clutch summitted with in the control so.16° sales.

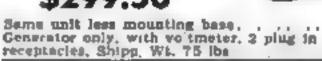
"WELLWORTH" BLOWER BARGAIN

2000-2500 Watt Light Plant

Heavy Duty Windings

Pineling liane for Automatic Bell Classing 2 Genove En gine Pulleys V Belle Bells etc. 415 107 Engine. Reigns & Strat on Ande 14 Engine Voltanter 2 plug in recepts ties. Portable Tulmilar Streit Skid Type Carrier Dimi L 3456' x W 17" z H Jo": Wt.

\$299.50



LELAND GENERATORS

2800 watts, 118 v. 40 cy. single phase 1808 r p.m., soff excited. 1851 model Brand new in origlbac factory crate, Shipp, wt. 185 lba. Lint \$375. SPECIAL. PRICE \$237.50

Furnished with 64 H P Briggs & Stratton gut engine (or equal) with drain. We, 231 lbs. List \$750. BPECIAL PRICE - - -

Quiet operating. Double wheel inlet, double width blower For heating ventilating cooling air washing exhausting and forced draft DIMENSIONS 10" wheel outlet 13"." a 11","; inlet 8"," Height 19" Width 18", Depth 16 ;" CFM 1,4" SP 1600 outlet vel 1575 Wt 45 bs \$27.50 AND DRIVE
With Bot, and variable speed pullers
extra (Motor required 14 8 p.) \$4:
Yurn shed with 14 b p. motor \$4.

BRAND HEW

PRICES FOR CISE AGO OR MONEY ORDER TOTAY SEND 10c FOR POSTAGE

PROMPT SHIPMENT, WHITE FOR CATALOG.

WELLWORTH TRADING CO.

1831 S. STATE ST., Dept. B-10, CHICAGO 16, ILL.

HOBBYISTS! SHOPMEN! Special 55450 PALMGREN "HOSS-E" Rotary, Index, Milling Table

Ideal for Model Parts or Shap Work Mill-Grind-Dvil Index-Rout surved or straight-Rabbet and Mortine on drill press or lathe, 8" Table, 4" Cross Feed, 560" Rotation, Acco-rately Graduated, Bolts to table Order NOW! BAVE \$100 Only \$84 to, Less Rotary Feed \$42.78, Write for "MOSS-E" Tool Circular.

CHICAGO TOOL and ENGINEERING CO. \$396 South Chicago Ave. Chicago 17, 511,



POW ERFULI PORTABLE POCKET-SIZE

HACKSAW

ge for any 1/4" electric drill or drill peace

Easy to carry easy to use-a 'must" for every borne craftsman. Full chip clearance on any wood, metal or plastic stock up to 2, " No gears, no bearings, nothing to wear out Weight. 11 oza, Gueranteed and only \$4 05:

Bend Cosh, Check or M. D. Todayl

BERTONN O, ENGINEERING AND SUPPLY OC. 3135 Herrippie St. Karress City, Mo.



Never before has the demand for welding been to greatthe profits so large. That & why smart operators everywhere are secting up their own welding butiness and you can do live same.

BORART BOSTHERS CO., See P-101 Troy, Bhio

SIMPLY CHOOSE from our complete line, the welder that best so its your acrds—gas or e ecitic drave-portable of stationary. The big pay jobs are was ling no don't m sails a opportunity. Write today

the of the world's largest by dets of are welders





abrasives INDIA® FILES



These handy formed fits stones give that final touch of keenness to auger bits, countersinks, formed plane cutters and other hard-toreach edges. Indispensable, too, for work on gun parts, reels, jewelry. They come in all needed shapes and last a lifetime. At most herdware stores—or write direct

Get the "Now to Shorpen" Book 32 pages of pictures and data on professional tool therpesing Send Oc to Dept. P5-10



COATED ABRASIVES PHARPENING STONES - MASKING TAPES Also Manufacturers of Abreeive Paper and Cloth



everything you'll find in topes costing ever \$1.50-plus.

- anow-white blade with bold, legible, jet-black numerals and graduations. Graduated in 32nds for first 6 inches.
- sturdy die-cast case heavily chrome-plated, calibrated for quick reading inside and outside measurements.
- blade ½" wide made of finest high carbon steel—tempered Bonderized—enamelled—baked.
- blade replaceable in seconds—without tools—without even opening case. And Evans replacement blades cost far less.
- every "Evans White-Tape" is unconditionally guaranteed.
- exclusive Evans automatic brake gives smoother push-pull. action with absolutely no "creeping" of tape into case.
- · underside is white, too. Mark with ordinary pencil, remove mark with flick of thumb.
- unheard-of low price*: 10-ft. \$1.49, 8-ft. \$1.19, 6-ft. 98f. Prices higher in far west and Canada.

Walks & CO, + Hework S, N. J.

Maker out Expect It Faiting Rate out to thing & of the

Sold only through retailers.



SOLVE!!!

GENERATOR & BATTERY PROBLEMS WITH THE AMAZING NEW INVENTION SELECT-A-CHARGE REGULATOR

WITH HADDINGER CREEKE CONTROL For Metter Constator and Mattery Servicesepar-Brighter Lights When You Want Them. Suttetin S-A-C FREE Gargateed, Territories Open



Mule Team Tractor

Finest low-cost tractor Costs too little to do without. Engines burn gasoline. Sevan models. Starter and lights avai able Other arger Models

to choose from, Over 4,000 to world wide use, Time-proved and tested, At low cost they easily mow, plow, dies, harrow, plant, cultivate, etc. Sold only direct to user. Write for Fitch de a i-

OTTAWA MFG. CO., 2-101 Garden St., Ottawa. Konsas



CUTS WIRE AND STRIPS INSULATION IN ONE SWIFT EASY MOTION! NO CUT WIRES - NO LOOSE ENDS!

No C.O.D. s. Please

ADJUSTABLE STOP FOR COM-MON WIRE SIZES REMOVES INSULATION AMAZINGLY CLEAN WITHOUT INJURY TO WIRE A real stardy tool made from selected tool steel hardened and tempered Precision ground for vears of service Thousands in use Satisfact on guaranteed Cuts wires perfectly frayed ends or strands

Send One Deltar Iv:

THE TEE-GEE COMPANY 3-10 Railroad Street Helyoke Massachusetts

This One

L73J-TH1-6LND

US BARGA THEBIGGEST SALVAGE CO. BUY DIRECT FROM AD

YOUR OWN WESTIMOMOUSE 3-6 danime 100 .



\$17.50

instructed flaten rouded flaten 201 kmps N las ructions in Vote 250 RPM Ship notron 50 H Stock No 767

THE R C MA STATE CONVERTS TO REC WILLIAM 300 250 AMP. -----

Hack No 711 D C. Generator N I Julk E. Mebrits rated 300 Amp 30 Valta. Gov'l rue I be let I has raction for converting to warder or any panel out A so octobre matrice to me and discrete for converting the fill or Proceeding to the Complication Wester 127.50 and Light P and Included, Only 17.50

Generator Voltage Reputator
For the with 24 or 3 % to 0 Generators Also recommended for the P I and B I save generators in build your own. Light plant Camplete with mounting \$6.50



B E BENEMAYON Beand orn Navy Tales For Farm Rome Ranch He lasts 640 A to 101 at 133 EP M Rail bearing sup pirted han couled armature Felf Indicate airing bearing 21122 A Wi 214be 37.50

New Amplidyne Motor Generator

its to t Dt moor but a ty HP or o as V Ht Can be anapted to 100 V At II HP by a m p a shangen in connecti a This unit can be adapted This uply can be udapted to independ the independent and ruce of the control of t I ghttng-But they I Stech E 780; 1 4122 1

\$7.50 Mr. Ly ECLIPSE MOTOR & GEAR UNIT



cost 4449 00

Brane new including built in 24 V. O C motor blas hortzouts and 1 section into off shall livers have cost \$221 On Increasing with the 110 V AC on the course to the first that the course the course to t

VOLTMETER D.C. Scond Now The Indian element of this meter to be that I'd Vie meter with the center The internal resistance in the china The that may be easily

center The nternal restrance and the chims The that may be readly alter ed to read \$3.50 Post part to the property of the control of the cont mate of any to the Mode \$2.50

Yalugbie Gears Bargains—Speed Beducer at a or 5) ratio W degree angle Shadedries by applies Shafe with 3 mounting boles 5 15" Gears had in Figure and match had abuse non-housing with two necre bearings one treathe hearing and three high append while hed been sing. Next of \$5.50 outflettership to the postage.

SENSATIONAL SELSYNS Two or more connected torother work perfectly on 1.0 AC her weather vones relating diif there operations Committee in the diagram and instructions with 21/2 the, FER

PAIR



CUNO QIL FILTER-Broad New Alegraft type Flature oil without carridge replacements Just turn handle and cartrilge to clean Standard 34" Intel and offer 8694 ports to accommission ports to accommission of the operation of the STOP CHANCING C \$4.95 Post Instructions

CLECTRIC MOTOR 1. M.P 28 Volt for R P M 4 AR E 38 12 W Straple Restrictions to convert to 28 15 % U.S. Gov. 1 \$4.95 & 12 M P 28 Volt for ELECTRIC MOTOR 12 M P 28 Volt for CONTRACTOR TO ME THE NEW TOWN SA.95
ELECTRIC MOTOR TO ME THE NEW TOWN THE REAL TOWN TO SS.50
COST FAIRS REAL TOWN TO SS.50

Cost Fullet Report New
ELECTRIC MOTOR 6 WOLT DE Bolom-New
Hamber 4" fan binde. I ve as wandel ets in per
me in hot winter out bearer moust commer all
ar list applications." (sa list long staff.
Size 5" long a 2" 2 mount ar stude. Form those
II I'M New
Only

2.35 postage.

SOLA CONSTANT VOLTAGE REGULATOR Per a 12 has need the per to be to be the best first for the best first first first first first \$94.5

HT PRESSURE CYLINDER

to be a majety locking pin Apr thatte as the inflator five extiguisher a) at parotting life raft, ate haste mind but it a 2 a Wil 1 lim 59 05 pine Chr. \$2.95 po take



Exhaus Der leur Dieter beiter Valus Brase new horland og twell in 21 s 1 D f aperiar Uppens half et ports in pair (n - n Tope 5 2 Mare tange or sequen e Gos / rost \$27.50 111)

AIR FILTERS

Arcraft type Removes det dust etc. For unit t a home à laborat case. For forcest warm air etc. to the most with a Maje of hea a me aller mesh with metal frame Permaticht press to press to a him display as him al press to quant to meral. We are to quant to meral to an analysis of the press to a pression of the press to quant to meral. We are to quant to meral to an analysis of the pression of the H 2he # 5 Ht saur \$3.50 ea

Brand New Wenderful ROTATOR MOTOR For turning Main Th. PM Auton nam Turnishes Turneropes etc. Application for 110 V. A.C. 66 For the or for 24 V. D.C. na cutors. the motor Asprox 7 M P M Free hunted fevers a light Weight fourtent

weater Steeler cates to a diagram that the spring sty to Stock to \$7.50 foot

WEAVERS HYDRAULIC HAND PUMP BRANCE NAME For the dead of the first of the feedback of the first of the feedback of the deadle for a defent of the deadle for the feedback of the feedback o

water and to catality of the vering time con presented We in the A Sar of \$12.50 hard value. Santractions not. F or \$12.50 hard

Pesso Vaccom Air-General Purpose Pump

Hore a a purity for our fluid present or tacture Standard pipe thread the very bid. I have been to the service of the service CHINES I CHEPRE SUCHER
STATEM PIMP SEE BOR
DEER OF POMET AND SHOPPE
THOSE CHET NO ONLY



\$9.95 Pringr

Peace Contributed Massy Duty Electric Pump



with built on the R P motton facluded lift(A) A completely
set f contained laspine is proof
edes for pumping service in the original and the completely services are completely services and the completely services and the completely services are completely services. Apriles a for 11 to A Cor on 1: to a A C The Discharge its 400 fg 2 H Tag them for to Taken Rasements Satsprat rich Bears etc. Here & your Gentrat PLACE VALUE 11 185 139 president data and instructions. 865 or value Stack 12.95 K C.



PUROLATOR STORAGER FILTER

Fi ters your Hydraulic field gas or he for dist are with un car to see ten scement. Protect your his unit THE NE POR De DEL TER furn handle and element Scandard has thirt as four Avoil That stopped to list and a stop of the stop only paid Strategewer Courtwat Displacement HEAVY DUTY PUMP

For operating Mydraulic cylinders, hid agir motors on true fore Bur deces. Construction much for a Probler Leit trucks For fuel or a Probler leductin applications etc. Del vers up to 400 f 1 H at 25th R P M Harred La to to 14th P 4 L 25th to 4,400 ft 2 ht HAR B 17T in ref 1 p 10 m wither direction without the state of the last pilot in the last pilot p

AT HEAD Reint on rither direction without adm 'ment tan be hard as hydrau motor be, no sa se hadrering data 4 increas \$17.50

AIR OR GIL HYDRAULIC CYLINDERS

thuck the \$12 includes 2 at the last 1 a 21 including built to the small control valve at 1 a Including ma) we be atenued you or lessed to a mount of he at length shaft re-tained 14 870 00 \$14.95 to be sales We B 150

Seach Mo. 83 (south) Artise 25 g" been 6" atrake "Shat" r eve missinting twee 6' stroke Shat' reve point of times and state and times to provide the with time P & I inter Har a respectly of 100 line with our STRATOPHARM (so P & I & She of water \$8.95)

stock # 303 Single Act on 2" here 1184" of he 148 by Overal sanger shart retracted at 2 tokic be expectly with 1010 Pag. # see 2800 stock with at \$17.50 for he at a opened with 14 tok \$17.50 kt Mo. at a spring of the set in the \$17.50 kt Mo at a spring of the Mo 12 Mydraulic Cylinder Double Action surface 12500 to be a predict of the set o

Perce Hydroctic flow Equations A Pressure Helencer Vatve Brand New Guard Dermater Cor Two cyl miera and squal persons for Two cyl miera at Two cyl miera at Two cyl miera at Two cyl miera at Indiana at Indiana at Indiana Inc. A 1 00 value 514.50 Pact Brech 3-0-307



HYDRAULIC CONTROL VALVE

Adel Precision #8 to 129 For controlling 2 at a rect in or I double set up or more let the die on it this pressure un one cal fider is the order of the learn to the course to the Brutta position and lock cathedra field new Airementon bergain 18.95 part



🚜 . Hydraulic Solonoid Control Valva RENDIE No. 01500 24V, D.C. For ecomor construct representation and to user a relief stocker act on or dout e act ob hydrau c ratioffers with 24 V 25 Recomplianded pressure Mod to 1500 P 5 1 c nonethons are 35 ff 18thd Disprays a Data lact 0.5 D year pair

PARKERS 3 WAY POTARY VALVE

Brand New With off postilion and manual operated At connections are \$2 female | P Tate thinks are \$2" Permate I P Total state is real for 1 branch line and lot low pressure fuel water are or liquids 14.95 mat part



ALTERNATING SHUT-OFF VALVE



Misted New High pressure Op-ers se by with gent tem oper at me puppers to attendedly often a track other part of flur ports. Standard for pipe perts \$15.00 14.05 post \$4.95 paid villue only

Large Volume hydraulic control and pressure of three de porte single to builded Sange 1250 P.S. 1 ad justable ut to that \$5.50 post 01% Wrand Sew \$5.50 post 4.1



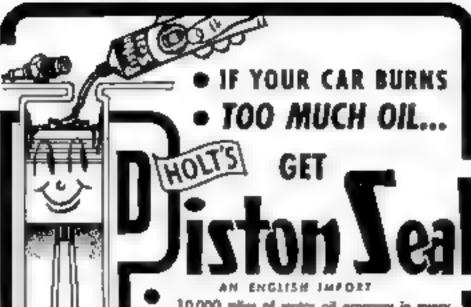
VICKERS C48 STANT OIS ORAULIC

New Stock No. PE TE For any type Huntel pamping Job. 375 gal per for in 1750 h P in 1000 P 51 a c eu for all

cost #100 no

Send Check or Money Order All Prices F O B R.C. M.O. Except When Marked Postpaid, U.S.A. Dniy-1; Deposit With C.O.D.

LL SALVAGE CO., 2922 E. 27 St., Dept. 277 Kansas City, Me



10,000 miles of water oil economy in every hiba. Restores compression, stopu piston slap, improves angine performance, and pays for built Many times over in reduced all consumption. Endorsed by automotive experts everywhere—improves all internal combustion engines. Anyone can butall—just remove spork plugs, insert rebber tube and squeeze.

Send for complete details—PREEL AUTOMOTIVE AIDS CO., DEPT. 4-5

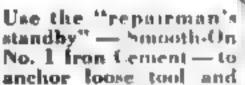
201 East 5th St., Plainfield, N. J.

AUTOMOTIVE AIDS CO. 201 East 5th 61. Plainfield, N J. RUSH DETAILS ON PISTON SEAL—PREE!
NAME
Aboress
CitySTATE

Tighten Loose Handles

OVIET

CAREFREE



cutlery handles, knobs, pulls, easters, clothes-hooks, bolts, screws, etc. You upply it like putty — no heat required. It hardens like metal. And because Smooth-On expands slightly as it sets, your repairs stay tight, Buy Smooth-On No. 1 in I ¼-oz., 7-oz., I lb. and larger sizes at your hardware store. If they haven't it, write us.

FREE Repair Ideas

40 pages of time-saving, money-saving ways to stop leaks, seal cracks, tighten loose parts. 179 Illustrations. Clear, simple directions. Send now.

SMOOTH-ON MFG. CO., Dept. 58K 670 Communipaw Ave., Jersey City 4, N. J.

Do it with



Originally used by the threy to central genery targets m haing tread by an attylene, ideal for many uses, This winch will pay out, hold or roof in cable or req It has a councity for 4500 four of 3/32" cobla in 2500 four of 1/8" cokin, The returns drym is year driven

and in agreement by a crank handle. Oran may be retate rather. A breake hands draw with with rescher & pro- to not Stan 2010 a 1371 a 1311



PRECISION GERMAN

MICROMETER One of the finest quality, imported precision tools on the market Roads from ,001 It has

is ratcher step for absolute incouracy and in ach ring to hold setting sacure. Head consists decimal phart,

THESE ITEMS ARE TREMENDOUS

NEW

>MSIDE-OUTSIDE

CALIPER

Allowance Insule - Outsule & Dopth from 2001 to 8 in. Rands both English & Motric scales, Specially hordannel yours. Sinding you have lock net to held earning. Irale by one of the leading specialists in procured instruments

6im. SOLID STEEL STARRET SOUARE

Hos. agreeably hardwood leatest and edges, necessarily useund to incure parallelica and straightness, léade of femous surelesy motorcate and heptity regarded for its was us a standard square. A PALLEY VALUE for ONLY. .



DRAFTING

Originally used in engineering dept of one of the leading asscraft plants. Hes 24" arms. Head entrys 360 degrees. Clemp-on meaning, in excuttent cond. Writest exclusi-

PLASTIC PARALLEL STRAIGHT EDGE

A valuable sense to the necessaries, engineer, draftsman tion adjustment knobs. Rubbus 970



A-H - IC-IL HARNESS WIRE

26, 14, 12 GUAGE

Handy for energoncy reports on radio ins, arcraft cones, boots, etc. Said. anly in bundles of 6 pouries or more. These bundles are in reved groups & leagues, very class is uncontind They make represelly wells for 4g to 5¢ per fact. Here is your apportunity to hough stack of memory appared graces (operes, he per it.) 295



CONTINENTAL GAS ENGINE

SINGLE CYLIN SHUINE WHA I DER & CYCLE.

SEAL, An Cooled * Head, Cores emplote with all occursories such as, with type on cleaner flywheel, anagements, floor type conscience, first rank, starter pulley multier blower housing, ste. An ideal power plant for small form machinery lighting glants, our compressors. nesse tanks small boots

Peoples only 43 first

hispithy would but parfect. 360 2 to a

5 8 18 134 460 P. PL. TAPS 484 11.111

or Their Owners Defense Plants, with r darry \$1 500,000 start al machine on each an Tops. Dies, Cutters. Nas-are, are

PESTINGHOUSE AIR COMPRESSO

1000's now in one for merchang, infignen, dir Nee B. on q4042264. Inhorntonen, shopt a ge trucks tractors, jeeps, etc. Lightweight but powerful. Doormes.

an 12 HP goe or electric motor Runs a thin direct in. Delivers approxi-1.27 C PM =1 600 RPM = 6 54 RPML et 1200 Rpm. Hiss 3" layer, 1" stroke-

the hove meters, tooks and 9295 for on the notice this unit

TINY MITE

Then mightly lately quart little up to 1000 the - m eta 36 de l Brance garar de un Calato desen a 4ºº

- 1 ," Ratchet handle, salety & te lease ain. Idea for Boots, Form, Factory, Shap, ONLY,

1 1 20,000 m threat (pesh pull) using 1500 PSI line pressure or obtained from our hyd, surge, Or will preduce 40,000 fb. threat with 3,000 lb, line gressies, CAN ALSO BE OPERATED ON LOW PRES-SURE AIR SYSTEMS, 4" Bore, 156" don. piston shaft, 18" strate, length 30% Environd with ball bearing looked claves type mounting and arrival type high presture steel pipe brocker/ormony was, lifest for rood, form & shop machinery, 29, presses, stc. Cost Gov's 1390.00

HYDRAULIC CYLINDER SPECIAL

e sarry the World's Largest Supply of Special Hydraulia Equipment funtacing ever 20,000 Cylindors in 61 Sixes and poet. Can also supply all occursories each no Pumps, Valvus, Tunks, Hone and Fistings. Welfe for information.

Me. 3 MYDRAULIC CYLINDER Double action, Bare is 1", Shalk 5", Has a strake of 25" to 4", Strake con he edjusted with internal closus stops, Overell length is 819", Will rain 1500 Ibs. continuous duty, 3000 fbs. 575 intermittent, Will tide or push 575

No. 9-E HYDRAULIC CYLINDER Louble notion cylinder, they a have of 1-3/9" and shoft of I", Stroke is 9". Overell forgh 1512", Built for 1500 lbs. continuous duty. 3000 lbs, intermittent. Will life or push up to 2100 975 thou . . Con he edepted to undrade of uses seems

FOUR WAY VALVE PRESSURE RELIEF VALVE "Standard pipe parts. Fran-1200 PSI, Rango 1000 575 hore self-line - courses. 39 2100 PSI.....

- Papert type, pressure bulenced Him gratum with built-in ralial value to limit cylindes strukes, Islat and author parts have he's and, pipe parts. h" A.C. No to eyl. (" = 18 975

MARKO SACRA LAURIO With huilbin sociable flux central value in head, Pagtrive displacement piaton type, displaces 1450 cm inper revolution. 2 gel. per. min. cep. er 1500 RPM er 1250 PSL Pressura femil, 1250 PSI quetinyays, 1400 PSI for 15 sec. Operates at 3750 RPM, intermittent noximum 4500 RPM. Ruteton orthor direction with.



GEROTER TYPE PUMP Lagan Geroter type, For apareting hydroulis systems on trucks, tractors, etc. Delivers II GPM at 1200 RPM or 1000 PSI with 5 H.P. Con also be used as Hydroulic Huid motor, 3/8" and, pipe parts, 1/2" upliced shall for pulley or direct attachment, 51° direc, 7° long, Used but condition guaranteeds



This is really TWO IRONS to CHELL A central button in handle safects 150 or 100 watt heat. Full size was for light &

200 Pg. SAVE BSS CATALOG S-WAR SURPLUS

1000's of MONEY SAVING Borgoons for the Machenic, Housewills, Manyfecturer, Hobbyiss, etc. Clashing. Tools, Machinery Metals, Electrical Supplier, Meters, Rubber, Plostics, Hydraulic supplies (cylinders, purps, noters, volves, fittings, hose, etc). Send He to saver mailing & leading

SUPPLY CO 6321 SAN FERNANDO AD. Days PS40 GLENDALE 1, CALIF

MIN! MAKE YOUR OWN ARC WELDER! MERCY A REAL BUY! Finest, Procision holb, R-I Consectors, or to iselfy used on 5-29 Airplanes. These generators cost the Government approximently \$600,00 each, Given from

300 to 400 area at 27 vales. blact for all walding, light & top up to 5/8" thickness. Free instructions for converting to walking unit.

& Electric GYRO

phofes to drive precision tools or machin-

ery of precise, controlled speeds. Full

half fearing insunted, Operates, high or

law valtage A highly precise instrument,

ideal for asparimental work, science labo,

habbyists, Literation of an 425

Turns up to 50,000 P.M.

Efectric drive mater is in-

tegral part of befores

wheel. Her double and

Electric ACTUATOR

Hundreds of uses for my

mechanical device need-

ing controlled 2-way not-

ion, Opena, closes, roises

or lowers doors, wind-

Heavy Duty G.E.

15 H.P., 24 vals

made peer

\$4.5 to 1, resulting in 168 it.P.M. or

5 8" diameter toke-off shaft, Natur con-

UNIT COMPLETE 1072 MOTOR 473

Electronic Trusmisse, Gear Train

GT-1 - approx. 50 Branco Spur & Pinion Georg, 3/8" to 4" dia , 5 sens of 7 clus-

ter peers, 2 complete worm and worm year

drive sets, 40 FLD, bell bearings &" to

1'c" din., weech springs, bushings, pasts,

free plates, housings, micro switches 2 ministure controlled clutches, etc. . .

VALUASLE GEAR BARGAIN

tenne, etc.

Ideal for moving ratio

meteoria, tulavizion m

GEAR BOX - VTG-1 - 90" - bevel

gene Byta I enduction, A life-

Genra in multiple size and sequence fentical teath estin, giving 100's C49

#s, 10 lbs............

toins alactes magnetic break.

GEAR SOX ALONE 7

Geer Head Nates.

marble roter will

drive reduction

bee unit

ers, gotes, values.

CTU-2 Feats Singer sensorus, 24 Volt.

A.C. or D.C., \$500 R.P.M., 1/6 H.P. -

Series wound mater, 41,2 strake in 13%

enconds. Congression and tension loads

se by 250 lbs. Adjustable micra-awagh

for Sinite of travel, Overall 695

GEAR NEAD MOTOTS

PER AIRCRAFT GENERATORS 27 Vales 200 Amps /595 E-SA 12 to 15 Vales 50 Amps /22 100 Amps 2500 1273-14 27 Valts 25 Amos / 6 95 22 Value

> VICKERS HYDRAULIC Transmission

Sall contribed, 2 H.P. constant farque et all smeats with smoothly walone reversible, pistur your femiralfed

by notation lever) supplying piston bydepulie metas. Automatic pressure, dech. pet for smooth control. Power autout RPM -0 to 1/2 input RPM in both directions. Input RPM 1800 continuous, 4000 intermitteet. Descript can be removed for proster RPM, Ideal for letters, duplicator servey on mills, conveyors, 3250

4" SPLINE SHUFTS for more 2 250

ELECTRIC MOTORS

LEAR ELECTRIC MOTOR, 24 volt. & empt, series wound reversible major with pain

load clutch, Mater same 17,000 it.P.M.* Max. II to I goor reduction has turning 1000 K.P.H. of toke-off, Adeptable to files or rigid driver. Limit switch box.



SAMPLL HOTOR 27 walts, 16 unga 1.5 H.P. ravaru nikle,

wound on moles, 3600 P.P.M., shall 9/32" disnatur, 12-spline, 4-1.8" s 10.1". 395 DHILT.

SURPLUS MOTORS

He, 500 - New % H.P. -27 Yell, D.C.A.C. This meter can be readily adapped to deliver up to S H.P. on 110 Vales, A.C. by the simple method of recoveraging terroture brushlends. Free diagram with wach 595 arder, A sensational value . . .

No. 506-A - Converted to 110 Value-A.C. Equipped with plug and 375 He Henry duty cord

D. C. METERS AMMETERS. - 30-0-30-1 - 60-0-60+

COMBINATION 120-0-120-VOLT AMMETERS 30 V. - 30 AMP.

0-120 0-240 1-301 ZQ Any obeye * months.J.

ABOVE ANNETERS MAVE 2" FACE EXCEPT 0-300 WHICH HAS 3" FACE IT IS NECESSARY TO USE SHUKTS

30 Y. - 60 AMP.

WITH ALL D.C. AMMETERS 30-A 60-A 120-A 25

PIANO HINGE

Overell ... Width ... Laugth .. Price on. + (5/8" side) - 72" ulun. - \$1.00

335" - (116"5 - 54" at. etnel . \$1.49 BRASS HINGE - IS" (S/T" side-"Bill thick) Any longth at . . pur it. . . 29

Sina: 7" . 6" ... 395

for forer metral for impaying & strongay-ng positive clutch. Duet proof housing, pro-laterated hearings Can be adapted to Vincers Transpolution.

LARGEST FIRM OF ITS TYPE IN THE WORLD

GADGET MIX - Rivers, Speciers, Bobs, Scraws, Georg, Wheel beeringo, Springe and Clarge. No. 106, 5 hou

PALLEY FAMOUS MIXES! Prep

PARTIES OF THE HOME CRAFTS-MAN, HOBBYIST, INVENTOR, GADGETEER & SHOP MECHANIC.

BEARING MIZ. No. 170A. Approx. 20 modle, Sall & Rollin Bewings, New & Used, Sires: 1.7" to 4". Some of these cost Gon's \$10a piece. Never such a value! 5 No. CHILY

HNIGE MIX, Ho. 1784. 12 pairs of Strap and butt hinges, Husps, 1" a 1" to 7/8" y 10" in length and 8" strap. 1.09

ARRASIVE AND GRINDING WHEEL MIX - 50 pieces including honing stone, pencil calls, wheels, esc. A shorp value. No.1704G 99E

SPRING MIX, No. 306 - Turnion, Compression & Tanzam Springs. A stade, 100s. A months from 169 (6)

RIVET ME - 3 POUNDS - CONNENING OF nizes from 1/4" to 3" long to many dismeters it alloys.

FILE MIK .. Ton uncorted Files .. i" 12", Includes Vinens, half rounds, mills, boszods, esc. - in seconds and used but good condition. I Visco slove is wach our price for entire mix. .

PULLEY MIX - You'll want this one rend. 10 miciona & maral pullaye ranging from I" to 5" with built and one piece bracings. These are aircraft pulleys, the best made - with hundreds of 2.95 WHEE, A PONDERFUL BUY!

SCREW MIX - 5 Hearting balling asserts ment of wood and machine screws. Many sizes. Soon dellars and shopy have pleasy of screws on hand. : 1,39

HUT MIX 166-1-3 lbs. opprov. 500 nut. Ancher, Luck, Costle, Han, Electic Step Nuts, etc. You'll always have planty of Hors in the shap, Mid-1 1 20

SUPER COMBO MIX - Mo, 102 Here's b barre mises for DHLY 12.95

AIRCRAFTCABLE Reat resistant, offered stool, Eater Res-

ible. Pre-formed, 7 a 19 strand. On reels. 1/56" - 454 ft. | 3/16" - 154 ft. 7/32" - 10lie ft. 5/80" - 5e ft. 1/4" = 12% ft. 1/32" - Pie b.

9/32" - 114 h. \$/32" - 74 M... 1/16" - 1615e ft. 1/2" = 28g ft. 3/8" = 58g ft. Special 5.16" coble, 18 ft. long with ibe #. tumburale ands...

Statulous Steel Cobie in Fig. Incomed 1 16" - 64 ft. | 5/32" - 204 ft. 3 32" - 14e ft. | 1 V" - 26e ft.

Bronco Coble - Het Pre-femal 1/14" - Se h. | 1/14" - 234 h. 1/4" - 172 h. | 1/2" - 284 h. - 30g ft.

Plan Steel Cable Homp Center 3" 28¢ ft. 7/8" --- . 25q h.

FIRE EXTINGUISHER

Kiddie Lue - CO' Type, Built to Gov't appolications, Heavy, thatter-great case, Recent byand fully charged. READY FOR INSTANT USE!!

th, nine with Swing Muzzle . . . 12.75 30 fb. site with Swing Nearle Ib. size with Hom 10 lb, nim with 315 ft.

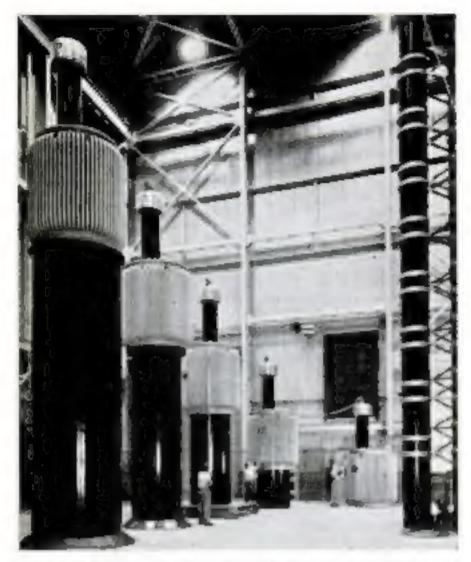
flexible hose and Horn, .. 15 Pb. size with Wheel Control . . 14.95

13" MONKEY WARRENCH

Adjustable Jaw - Opens to 4" Drap Forged . . Auto Types Slock 972

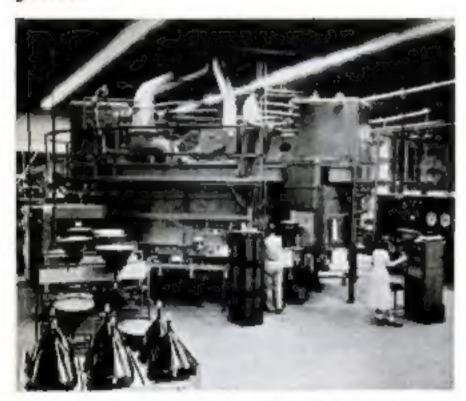
Defer from this ad. All sales finals Prices F.O.B. Glandale, Pay by M.O. or check. P.O. a accepted from D&B Frem Re deposit with C.D.D. to.

C-py-tytind pulmed



Transformers Test Power Lines

THE five giant transformers above are in for a big shock. Placed on successively higher insulating towers at GE's High Voltage Laboratory, Pittsfield, Mass., the units will be purposely short-circuited at 1,590,000 volts to study the effects of lightning on power lines. Such research helps develop more efficient means of transmitting electric power.



Big TV Tubes Get Big Machine

This giant automatic machine exhausts the air from two dozen 24-inch television viewing tubes at the same time. Thirty feet in diameter and costing more than \$200,000, it is said to be the largest equipment of its kind. Sylvania Electric Products, Inc., is the builder.

302 POPULAR SCIENCE

All About Russian Cars [Continued from page 111]

The same writer goes on with an example:

". . . A worker tries to remove three screws from a cover with gasket; as he has not brought the suitable monkey wrench, he might fix it with a hammer and screwdriver. He breaks one screw and as he can find no proper screw to fit the hole again, he simply forces another one into the thread . . . what does it matter if the thread of this valuable machine goes to the devil; the gasket will hold—at least until the next repair."

USSR Has Vast Resources and Man Power

But the standards of success in the Soviet are not the same as in other countries. As the former prisoner of war, quoted above, wrote: "The managers' state of Russia dominates its labor in a way that is quite impossible for us to grasp. The state extends its rule to every phase of living of the workers to such a degree that it has complete control over the liability side of the profit and loss account. Therefore, working at a loss in our sense of the word is practically nonexistent."

Despite all the talk about the inefficiencies of the Russian auto industry, we should be mindful of other warnings. Russia now controls the valuable auto industries of East Germany and Czechoslovakia. And we must remember that tremendous resources in raw materials and raw man power can be poured into a project on a scale that makes up for the waste and inefficiency. Russian tanks and aircraft, for example, have shown themselves to be of good quality and are produced in large quantities. It may even be that some of the deficiencies of the auto industry are due to concentration on more warlike vehicles. END

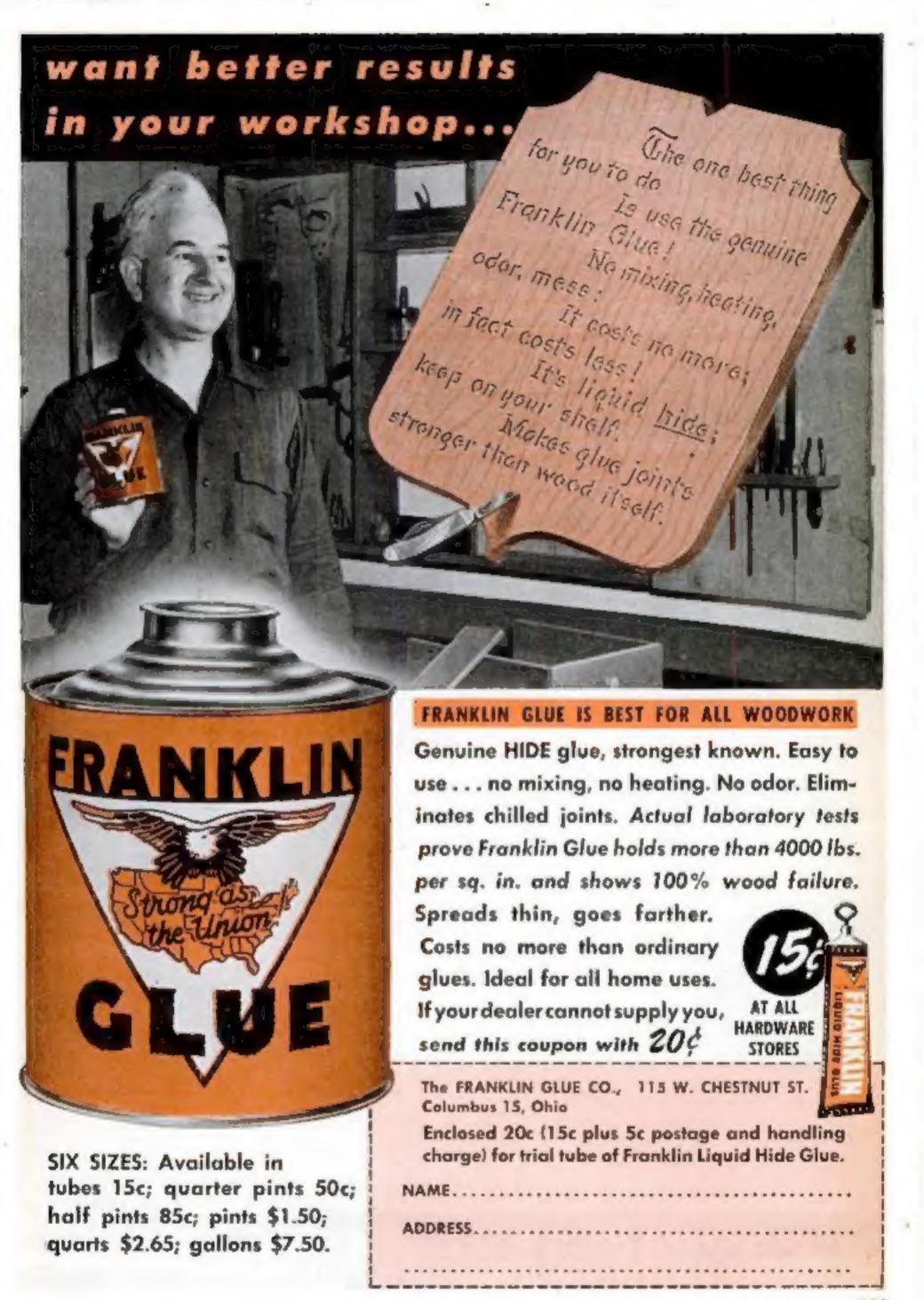
Eye Changes Shape to Focus

THE human eye, unlike the lens of a camera, changes its focus by actually changing its shape. Contraction of an eye muscle flattens the lens for viewing faraway objects. The camera lens accomplishes the same effect by moving closer to the film.

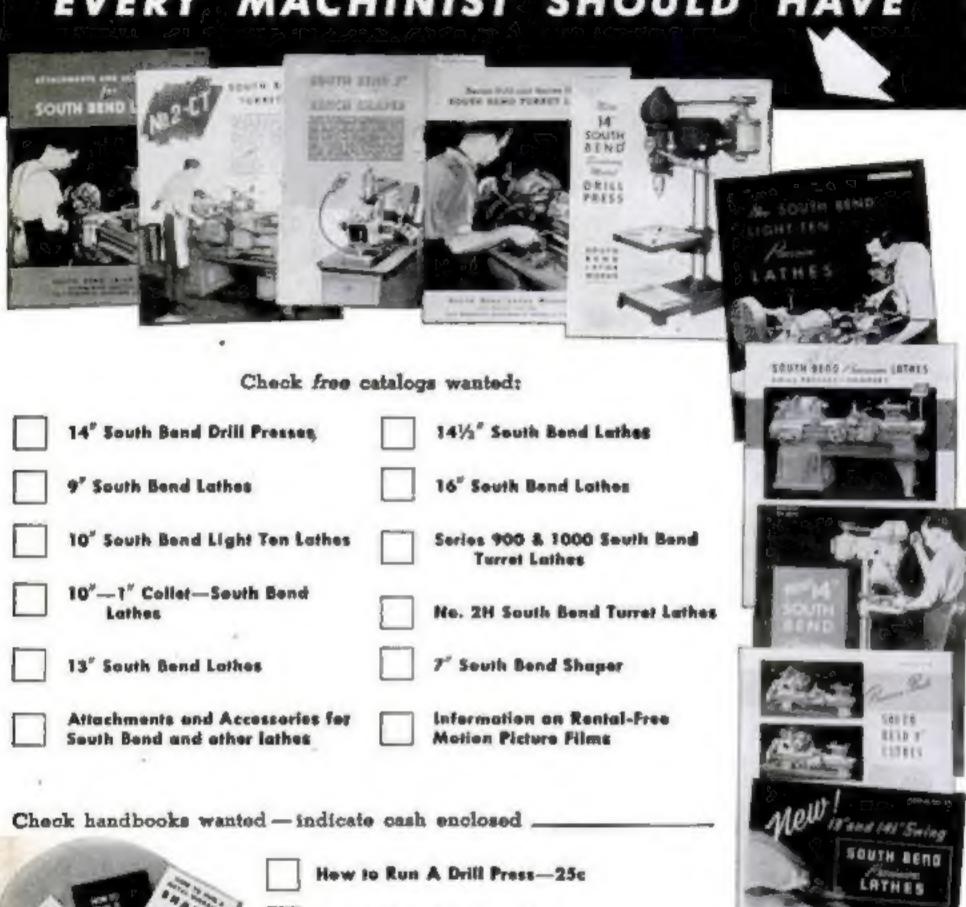
Aluminum Most Plentiful Metal

THE world's most abundant metal is aluminum, which makes up 1/12 of the solid portion of the earth's surface.

Complied Island



HELPFUL BOOKS EVERY MACHINIST SHOULD HAVE





How To Run A Latha-25c

How To Run A Shaper-25c

South Bend Machine Shop Course—50c

Please print name and address.

Street.

Cliy...

- Zолч

State

SOUTHBENDLATHE

SOUTH BEND 22, INDIANA . BUILDING BETTER TOOLS SINCE 1906

